

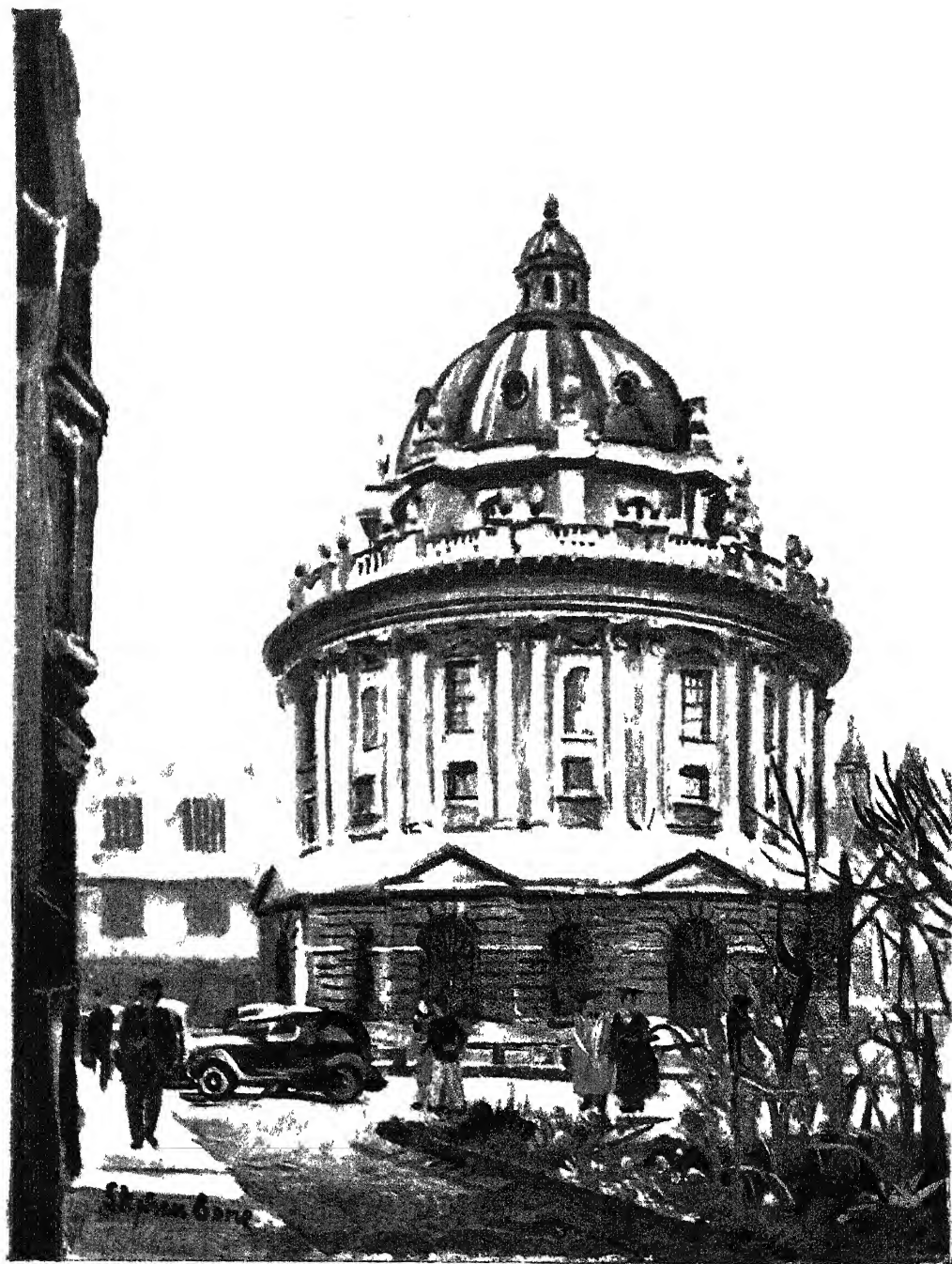
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The New UNIVERSAL Encyclopedia

Edited by

Sir John Hammerton

*Editor of The Universal History of the World
The Second Great War, etc.*

VOLUME ONE

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Its Editor presents—

The New Universal Encyclopedia

NOTHING is more obvious than the need for change which must overtake any encyclopedic work from the moment the world's affairs are thrown into disorder by such enormous dislocation as a world war involves. It was this that led our publishers during the War of 1914-18 to embark upon the large and costly enterprise of preparing, under the present editorship, an encyclopedia on entirely new lines, of which the first serial number appeared on February 10, 1920, after some six years of intensive preparation. And it was the hope of its editor that he had provided a work of universal reference, covering the entire field of knowledge and information in such a way that, for some generations at least, it would remain a standard work of ready reference requiring only periodical revision to keep it abreast of the latest developments in the sciences, in contemporary history, in the respective realms of thought and fact.

AS such the Universal maintained its pre-dominance through all "the years between." Its sales were quite without precedent for any such large work of universal knowledge, not only throughout the British Empire, but in foreign lands where the intelligentsia were readers of English. In the United States, under another publisher's name, it attained great popular success after a process of Americanising, which affected only a small percentage of its contents. But a further revised edition of the original Universal, in contemplation for some time before Hitler spoke the word whereby chaos came again, was abandoned when it was clear that no revision or augmentation

appreciably short of a *new* encyclopedia, so far as the main body of text was concerned, would meet the needs of the post-war world, while the same applied, though in lesser measure, to the illustrations.

Thus, for a second time, while a second world war was still raging, the formidable task of compilation had to begin all over again. With the exception of the Editor-in-Chief no member of the original editorial staff remained in service, an entirely new staff having to be recruited under conditions of extreme difficulty.

BUT after a continuous period of nearly five laborious years, with the exceptions only of certain basic and permanent contributions, such as classical history and pre-war biography, all else has been contributed afresh by a staff of eminent experts. Save for a very few pages where there was no need for change, and where change could not have improved them, the whole work has been re-set in conformity with its original style, which had won the approval of a whole generation of readers by reason of its unusual clarity.



Photo by Howard Coster

IN a work where the picture element is so important (our total of illustrations now approximates to 25,000) a large proportion of the original illustrations had to be retained simply because they could not be improved upon, but even so the present edition contains between 4,000 and 5,000 new illustrations, either replacing such as had become out of date, or expressly prepared to accompany some of the thousands of new articles which have been written to cover the progress of knowledge in every branch

of science during the last twenty years, and especially every aspect of the changing world since 1939. Moreover, our illustrations really *illustrate*. With but rare exceptions the maps, which form so notable a feature of the work, have been drawn afresh, and all those reproduced in colours contain the latest frontier and boundary lines as far as these had been internationally agreed up to the hour of going to press. Any further modifications that may be the outcome of UNO decisions will be duly recorded at the end of our final volume, the whole work being planned for completion in a total of ten volumes.

BUT in this matter of newness the most important change concerns the general text. The amount of the original letterpress retained is less than twenty per cent of the new aggregate, which exceeds eight million words, and is limited to those subjects that, in the strictest use of the word, were finalised from their first writing. Thus incomparably the greater part of the *NEW UNIVERSAL* has been written by a galaxy of new contributors from the mid-war period onward, so that the sum total represents the latest information about every subject in which the general reader is likely to be interested.

THE reader who fully appreciates the significance of all this is not likely to question our editorial claim that the *NEW UNIVERSAL ENCYCLOPEDIA* lives up to its title in being both universal and new. Indeed, it is confidently offered to the reading public as the first post-war work of its kind completely "up to date" in all its contents, literary and pictorial. And here it is important to explain, since some lapse of time must take place between publication of the successive volumes, that as each new volume goes to press every single item that might be subject to the slightest change is closely scrutinised for further notification under *Novissima Verba* (or Latest Information), a supplementary feature which was originated in our first serial issue and

proved so useful towards attaining absolute completeness in each edition.

WHILE new knowledge is the important feature of the *Universal*, ancient lore must always be part of that reading which, as Bacon says, "maketh a full man." Hence the *NEW UNIVERSAL* in recognizing that need offers a comprehensive survey of learning.

But, with our eyes intent upon modern things, we have sought to reduce greatly the more antiquated matter which still bulks largely in many encyclopedias, rescuing from it, however, every fact or thought that might be of value to the post-war reader in the enrichment of his mind.

BUT merely to set down as briefly as may be the main established facts concerning every subject deemed worthy of inclusion was not enough for the purpose of the *NEW UNIVERSAL*. It aims at being of real assistance to its readers: suggestive, helpful, *practical*. Thus it is an encyclopedia with a point of view. Its technical information is accompanied by comment or advice—the advice of those best qualified to give it—its biographical facts are seasoned with some words of appreciation, its historical articles enlivened by reflection.

An encyclopedia should be its own index, and should be so compiled that anyone in search of a particular reference may find it forthwith. Hence, long and exhaustive treatises are eschewed, and every one of our more than 400 contributors has sought to convey in the fewest words the maximum of information.

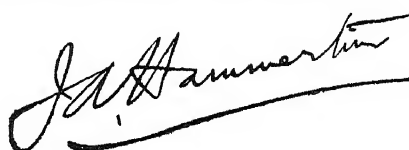
OUR list of contributors contains scores of names that stand for the highest level of contemporary knowledge in the sciences, the arts, and letters. But all scientific contributors have been discouraged from expressing themselves in the professional terms of their science: clearness of statement is everywhere evident in their contributions.

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Expert on pigments and varnishes; author, *Natural Varnish Resins*. *C.* Colour Mixing, etc.
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Authority on explosives, Prof. of Chemistry, Liverpool, since 1948. *C.* Explosives, etc.
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Critic and politician; M.P. for Wood Green, Middx., from 1935. *C.* George VI
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Professor of International Relations, Jerusalem University. *C.* Jerusalem; Jews; Palestine
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D. Phil., Zurich Univ. (Germanic and Romance Langs.); author, *The Loom of Language*. *C.* Language
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Director-Gen. U.N. Food and Agriculture Organization, 1945-48. *C.* Agriculture; Food and Nutrition
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Professor of Political Science, Univ. of Cambridge, and authority on the U.S.A. *C.* Roosevelt, F. D.
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Gen. Sec. Civil Service Clerical Assoc., 1919-42; M.P. for Rugby from 1942. *C.* Civil Service
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Gardiner Prof. of Bacteriology, Univ. of Glasgow. *C.* Antiseptics
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Adj.-Gen. to the B.E.F., 1939-40. Home Guard Sector Commander 1941-45. *C.* Home Guard
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Former Lecturer in Physical Metallurgy, Central Tech. Coll., B'ham. *C.* Blast Furnace, etc.
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Novelist, poet, and literary critic; author, *Some Modern British Authors*, etc. *C.* Wells, H. G.
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City Engineer and Surveyor's Department Cardiff. *C.* Breakwater
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London School of Printing and Kindred Trades. *C.* Printing, and many shorter articles
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Professeur en Sorbonne, medieval French Literature. *C.* France
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Lecturer in Oil Technology, Dept. of Geology, Imp. Coll. of Science. *C.* Petroleum, and many other articles
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Lecturer in Mining, Imp. Coll. of Science and Technology. *C.* Mining, and many shorter articles
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C.O., 1st British Airborne Corps from 1945. *C.* Airborne Forces

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Daily Telegraph War Correspondent, 1939-45. C. Greece, Liberation of; War Correspondent, etc.
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London general physician. C. many shorter medical articles
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Master of Balliol, 1924-49; Vice-Chancellor, Univ. of Oxford, 1935-38. C. Ethics; Logic; Philosophy
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Commander, R. Armour'd Corps, 1940. C. Army (Modern); N. Africa Campaigns; Tank, etc.
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Former Medical Supt., Brentwood Mental Hospital. C. Mental Disorders, etc.
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Dean of S. Paul's, London; eminent theologian. C. Heaven; Hell
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Archaeologist and writer on Scottish history and folklore. C. Edinburgh
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Antarctic explorer. C. Antarctic Exploration; Arctic Exploration.
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Civil and structural engineer, former Engineering Asst. in the Admiralty. C. Dock; Harbour, etc.
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Lecturer on Metallurgy, Imp. Coll. of Science and Technology. C. Copper; Lead; Metallurgy; Tin; and shorter articles
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Professor of Preventive Medicine, Univ. of Bristol; M.O.H. for city of Bristol. C. Health Centre
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Former Professor of Divinity, Univ. of Edinburgh. C. Christianity
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Senior Tutor and Secretary, Regent's Park Coll., Oxford. C. Baptists
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Author, biographer, and literary critic. C. Shaw, G. B.
- Sir CHARLES PETRIE, Bart.
Political historian and biographer; author, *Diplomatic Hist.*, 1713-1933. C. Diplomacy
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Distinguished Egyptologist; Professor of Egyptology, University Coll., London, 1892-1933. C. Egypt
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G.O.C.-in-C. Anti-Aircraft Command, 1939-45. C. Anti-Aircraft Command
- R. J. COCK, F.R.S. †
Zoological Dept., British Museum; Supt. Zoological Gardens, London, 1908-23. C. Animal Intelligence
- J. P. PORTER, B.Sc., M.I.C.E.
L.C.C. Dept. of Civil Engineering; Chadwick Medallist. C. Concrete
- J. L. PRITCHARD
Secretary, Royal Aeronautical Soc., and formerly editor of the society's journal. C. Flight
- HELEN L. PURSEY, B.Sc.
Dept. of Botany, King's Coll., Univ. of London. C. Botany, and many shorter botanical articles
- PETER QUENNELL
Editor of *The Cornhill Magazine*; poet, critic, and biographer. C. Biography
- A. S. QUITTENTON, F.R.P.S.
Scientific, criminological, and technical photographer. C. Photography, and many allied shorter articles
- S. K. RATCLIFFE
Person Lecturer, New York City, 1939. C. United States (1918-48)
- Rt. Rev. A. E. J. RAWLINSON, D.D.
Lord Bishop of Derby since 1936. C. Episcopacy, etc.
- ERNEST RHYS †
Editor of *Everyman's Library* until 1946. C. Book
- P. J. S. RICHARDSON
Founder and Editor, *The Dancing Times*; Sec. Royal Academy of Dancing. C. Dancing, Ballroom
- HUBERT RIPKA
Minister of Foreign Trade in the Czechoslovak government, 1945-48. C. Czechoslovakia
- W. HUNTER ROSE
Structural engineer; former Officer i.c. Works, Admiralty Works Office. C. Cement
- JOHN K. M. ROTHENSTEIN, Ph.D.
Director and Keeper of the Tate Gallery; Member, Arts Council of Gt. Britain. C. Painting (Modern)
- H. V. ROUTH, D.Litt.
Educ. Adviser, Brit. Council; author. Eng. Lit. and Ideas in the 20th Cent. etc. C. English Literature (Modern)
- Sir MICHAEL SADLER †
Distinguished educationist. Master of University College, Oxford, 1923-34. C. Arnold, Thos.
- GEORGE SAMPSON
Author of *The Concise Camb. Hist. of Eng. Lit.*, etc. C. Hardy, Thos.
- A. SHEPHERD, M.P.S.
Editor of *The Chemist and Druggist Export Review*. C. many Pharmaceutical entries
- P. CARNEGIE SIMPSON, D.D.
Prof. of Church Hist., Westminster College, Univ. of Camb., 1914-38. C. Church
- CHARLES SINGER, M.D., D.Sc.
Emeritus Prof. of Hist. of Medicine, Univ. of London. C. Medicine
- GEORGE SMITH
Editorial Director of *Flight*. C. Jet Propulsion; Rocket Propulsion
- MELVILLE SMITH †
Bridge Correspondent of *The Evening News* (London), 1931-47. C. Bridge
- J. M. SPAIGHT
Principal Asst. Sec., Air Ministry, 1934-37; author, *Air Power and the Cities*, etc. C. Air Power
- Sir EDWARD SPEARS, K.B.E.
Soldier and politician; Minister to Syria and Lebanon, 1942-44. C. Churchill, W. S.
- ROBERT SPIRA, LL.D. (Vienna)
Authority on Austrian law and politics. C. Austria
- W. E. STANTON-HOPE
Traveller, and writer of many books on ships and sea travel. C. Merchant Navy
- R. W. B. STEPHENS, Ph.D.
Lecturer in Physics, Imp. Coll. of Science and Technology. C. Physics, and various allied articles
- EDGAR STERN-RUBARTH
Expert on European politics and personalities. C. Germany; Hitler, and many related articles
- LLOYD STORR-BEST, D.Lit.
Neville Hart Chess Champion; former member, City of London Chess Club. C. Chess
- Hon. MABEL STRICKLAND
Editor of *The Times of Malta* and a leading authority on Maltese affairs. C. Malta
- FRANK SWINNERTON
Distinguished novelist and literary critic. C. Novel
- Rt. Hon. Sir FREDERICK SYKES
Vice-President and Deputy Chairman of the Royal Empire Soc. C. British Commonwealth
- Col. F. C. TEMPLE, C.I.E.
Past President of the Inst. of San. Engineers. C. Drainage; Plumbing
- H. H. THOMAS †
Editor of *Popular Gardening*, 1907-47. C. Garden, and many shorter allied articles
- ERNEST THURTELL
M.P. for Shoreditch 1923-31 and from 1935. C. Attlee, C. R.
- J. A. TODD
Principal of the City of Liverpool School of Commerce, 1923-40. C. Cotton, etc.
- RICHARD TRAILL, M.D.
Medical Director, Papworth Vill. Settlement. C. Pneumonia; Tuberculosis, etc.
- Lt.-Col. C. E. TUMBER, T.D., R.A.
Authority on guns and artillery, formerly of the Mil. College of Science. C. Artillery
- W. J. TURNER †
Poet, dramatist, and music critic; Literary Editor, *The Spectator*, 1940-46. C. Bach
- Lord VEN/RY
Founder and Hon. Editor of *The Airship*, and leading authority on dirigible balloons. C. Airship
- C. HAROLD VERNON
President, Incorp. Inst. of Practitioners in Advertising, 1945-46. C. Advertising
- ANTHONY R. WAGNER
Richmond Herald, and authority on Heraldry, medieval and modern C. Coat of Arms; Heraldry, etc.
- H. B. T. WAKELAM
Radio sports commentator and writer on sport. C. Football (Rugby); Lawn Tennis
- J. SIM WALLACE, D.Sc., L.D.S.
Former Lecturer on Dental Surg., London Hosp. and King's Coll. Hospital. C. Dentistry
- W. N. WARBURY
Chief English Press Officer to the Norwegian Govt. (London), 1941-45. C. Norway
- A. B. WATERS, F.R.I.B.A.
Lecturer and writer on building and allied subjects. C. House and Housing, etc.
- Sir ALFRED WATSON
Former Vice-Chairman of the Union of British and India. C. India under British Rule
- Rev. E. W. WATSON, D.D. †
Former Regius Professor of Ecclesiastical History, Univ. of Oxford. C. articles on Church History
- HUBERT WATSON, B.Sc.
Lecturer and writer on economics. C. Capitalism; Labour; Mathematics; and shorter articles
- E. B. WATTON, A.I.E.E.
Author of practical handbooks on electrical subjects. C. Electric Power, and shorter allied articles
- J. STUART WEBB, Ph.D.
Lecturer in Mining Geology, Imp. Coll. of Science and Technology. C. various articles on Mineralogy
- W. G. WEBSTER
Gen. Sec. of the Nat. Fire Brigades Assoc. C. Fire Brigade
- PAUL WEYEMBERG
Belgian author; Editor of the review of Belgian affairs, *Message*. C. Belgium
- NEVILLE WHALL
Secretary, Cyclists' Touring Club. C. Cycling
- Dame LESLIE WHATELEY
Director of the A.T.S., 1943-46. C. Auxiliary Territorial Service
- CHARLES WHEELER, R.A.
Eminent sculptor, designer of sculptures on India House, Bank of England, etc. C. Sculpture
- AMBER BLANCO WHITE
Lecturer on Moral Science, Morley Coll. C. Psychology, etc.
- DENIS WILLIAMS, D.Sc., M.D.
Registrar, National Nerve Hospital, London. C. Brain
- T. G. WILLIAMS
Principal, City Literary Inst., London. C. Political and sociological articles
- CLOUGH WILLIAMS-ELLIS
Authority on architecture, building, and town-planning. C. Architecture (Modern)
- HUGH ROSS WILLIAMSON
Author of many critical and biographical, and historical studies. C. Eliot, T. S.
- GILBERT WILSON, Ph.D.
Lecturer in Geology, Imp. Coll. of Science and Technology. C. Geology, and various related articles
- W. WILSON, D.Sc., B.Eng.
Manager, G.E.C. Devel. Lab.; author, *The Cathode-Ray Oscilloscope*. C. Electronics, etc.
- PAUL WINTERTON
Former Moscow Correspondent on the *News Chronicle*. C. Leningrad
- DONALD WOLFIT
Leading contemporary Shakespearean actor-manager. C. Acting (part)
- DUDLEY WRIGHT, Ph.D.
Editor of *The Freemason* and author of many books on Freemasonry. C. Freemasonry
- H. C. K. WYLD, D.Litt. †
Merton Prof. of Eng. Language and Lit., Univ. of Oxford, 1920-44. C. English Language
- V. E. YARSLEY, D.Sc.
Consulting chemist; member of Council, Inst. of Plastic Industry. C. Plastics, etc.

THE ENCYCLOPEDIA HABIT

Every generation enjoys the use of a vast hoard bequeathed to it by antiquity, and transmits that hoard, augmented by fresh acquisitions, to future ages.—MACAULAY

THE NEW UNIVERSAL is designed to be the companion and helper of everyone who is seeking information on subjects that either interest or perplex him. To those whose general education may not be so good as they could wish, it will open new doors of knowledge; but even to those whose education ranks them among the most intelligent and cultured of the community it will, by virtue of its wide scope and scholarly compression of scientific and general lore, prove invaluable as a constant source of ready reference.

A POPULAR phrase used to be "Get the Encyclopedia habit," and the advice is no less sound in these days, when it is obvious on every hand that the general thirst for knowledge, especially for those "fresh acquisitions" of which Macaulay speaks in the passage quoted above, has by no means abated.

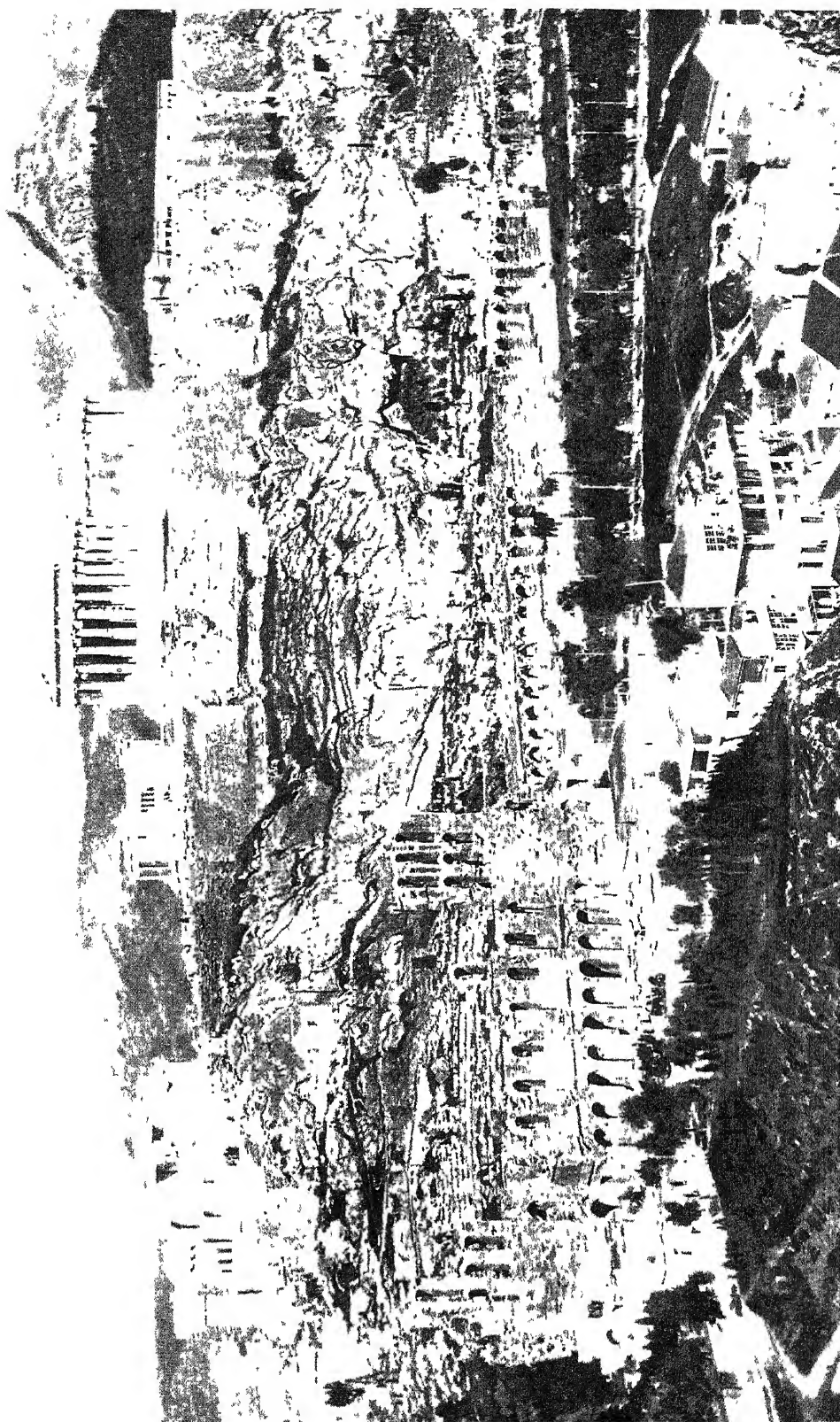
THE popularity of the so-called "quiz" as a feature of radio programmes as well as of many newspapers and magazines is evidence of a wide contemporary interest in facts of every kind. But such information as is derived from listening to or reading a "quiz," being purely fortuitous and unrelated to the immediate personal needs of the listener or reader, is unlikely to find a permanent place in his memory.

ON the other hand, he who cultivates the "Encyclopedia habit" becomes in effect his own "quiz-master," choosing his own questions and finding for himself all




he needs, and more, in the way of answers. He is systematically enlarging his store of knowledge, thereby increasing both his mental efficiency and his enjoyment of life. It is indeed astonishing how greatly one's fund of knowledge may be enlarged, and at how little trouble, thanks to this "Encyclopedia habit."


FOR example, nothing is more certain than that in reading your newspaper today or tomorrow you will encounter a reference to something that is not clear to you, or that you will find a writer touching very lightly upon a subject of which you know little or nothing and on which you would have welcomed further information. In all such cases the simple act of turning to a good work of reference and looking up the subject in its pages will result in the immediate acquirement of new and perhaps valuable information.

THUS, regarded solely as a companion to the daily paper, an Encyclopedia is an indispensable item of equipment in every well-stocked home, where it may be said to serve as a resident "Brains Trust." But its use is, of course, much wider and greater than that. There is no subject of conversation or thought on which a good Encyclopedia has nothing to offer by way of comment or suggestion to the man, woman or child who has acquired the "Encyclopedia habit." And the knowledge that is self-sought is the more likely to endure.




ACROPOLIS: THE CITADEL OF ANCIENT ATHENS AND CENTRE OF HER RELIGIOUS AND CULTURAL LIFE AS IT APPEARS TODAY (See page 74)

FOR thousands of years A has been the first letter of the alphabets of the civilized peoples. It is found in primitive form in various Semitic alphabets, including the Phœnician, probably earlier than 1000 B.C. Before that date, writing was pictographic, as seen in the cuneiform inscriptions of Babylonia and Egyptian hieroglyphics dating from roughly 5000 B.C. Most nearly corresponding with A in the Egyptian characters was  (âhom, the eagle), chosen, doubtless, because  the eagle, as the king of birds, was associated with the supreme god. For speed in writing, the scribes evolved a simpler form, . But these symbols represented a restricted range of ideas; they were not letters which could be freely employed.

The early Semitic  and its variants, though pictographic in origin, were used as we use the letters of our alphabet, to indicate the sounds from which words are formed. The first of the Semitic letters originally represented an ox's head; in Hebrew, it was named âleph, the word for ox, and cognate names were given in Arabic and Syrian. To agricultural communities the ox was



of primary importance—often an object of worship; the Assyrians, the Egyptians, and the Cretans all had bull-gods and cow-goddesses. The classic Greek alphabet formed about 600 B.C. was based largely on the Semitic scripts. The Semitic aleph in its various forms became the classic Greek (alpha) . At first there was only one form for each letter. But later, for more rapid writing, dual forms were evolved, the original forms being used as capitals, or majuscules, and the new forms as small letters, or minuscules. For A, the minuscule was *α*. About A.D. 400 another series of capital letters, the Greek "uncials" was used largely for inscriptions; in this, A became *Α*.

A Latin alphabet, derived from the early Greek, existed in 800 B.C., and had assumed its classic Roman shape by 500 B.C. It is this Roman alphabet that we now use for our English alphabet; indeed, the alphabets of all important modern languages, except the Arabic and the Russian, are based on the Roman. The Russian alphabet is a form of the Greek alphabet devised in the 9th century A.D. by Cyril, the apostle of the Slavs.

A First letter and vowel of the English and many other alphabets. Its commonest sounds in English are those heard in *bar, map, bald, name*. Under the influence of certain consonants and in certain positions it has the value of short *e*, *i*, *o*, *u*, as in *many, village, was, about*. It may be doubled, but this is rare, occurring only in names and words of foreign origin, e.g. *Aaron, Baal, Ealaam, aard-vark*. Combined with other vowels, as in *ae, ai, ao, au, aw, ay*, it has in each instance except *aw*, more than one phonetic value. The diphthong *ae*, corresponding to the Greek *ai*, as in *Caesar, aegis*, is frequently pronounced as two syllables, as in *aerated*. *Ao*, pronounced as a diphthong in *aorist, aorta*, also occurs in the word *gaol*, pronounced and commonly spelt *jail*. *Ai* and *ay* usually have the sound of a *n* in *name*, but sometimes they have that of short *a*, *e*, and long *i*, as in *plaid, says, aisle*, and *quay* is pronounced *kee*. *Au* generally (*aw* always) has the sound of *a* in *call*, but in *aunt, gauge, laurel, laudanum* that of a *n* in *father and name*, and of *o* in *not*. See Alphabet.

A. In music this is (1) the sixth note of the natural scale of C. In the Middle Ages musical modes were started from most of the notes of the scale represented by the level—now white—keys of the organ, which are whole tones apart, except E—F and B—C, which are semitones. The order of the tones and semitones in the mode which started on C is now the normal or major scale, hence

the subordinate position of A in the modern scheme of musical notation. (2) A. being the pitch of one of the strings of each of the bowed instruments of the modern orchestra, has been chosen for the tuning note. The Philharmonic pitch of 1896 standardizes A as 439 double vibrations per second at 68° F, except for all-wind bands.

A1. Symbol for first class. Used originally in Lloyd's Register of Shipping to denote the best type of wooden vessels, the only ones then in existence.

Aa (Lat. *aqua*, water). Name of numerous small European rivers. The Swiss Aa, in the cantons of Lucerne and Aargau, drains lakes Baldegg and Hallwyl into the Aar. Two rivers Aa fall into the Gulf of Riga. In Germany the Westphalian Aa is a tributary of the Werre, and the Munster Aa a tributary of the Ems. The French Aa, between the departments of Nord and Pas-de-Calais, is navigable from Gravelines to St. Omer.

Aachen. City of Germany, also known by its French name, Aix-la-Chapelle (*q.v.*).

Aahhotep. Name of two Egyptian queens. The coffin of Aahhotep I, mother of Aahmes I (c. 1580 B.C.), found by A. Mariette at Thebes in Egypt, 1859, and now at Cairo, contained her mummy, with a collection of fine jewelry. This included gold and silver boats with crews, a ceremonial bronze axe, diadem, mirror, gold chain and scarab, and hinged bracelets.

Aahmes. Name of two Egyptian kings, called by the Greeks Amasis. Aahmes I (c. 1580 B.C.)

expelled the Hyksos from Memphis, and founded the XVIIIth dynasty. Aahmes II (d. 526 B.C.) revolted against Apries the Pharaoh-hophra of Jer. 44, and seized the throne. His land being invaded by Nebuchadrezzar (or Nebuchadnezzar) II, he contracted alliances with Croesus, king of Lydia, and Polycrates, tyrant of Samos. He opened Naucratis to Greek traders.

Aal or **ACH.** Indian dye-stuff. Prepared from the wood or roots of various species of *Morinda*, chiefly *Morinda cūrifolia*, Indian mulberry or togari wood, it is used to dye cloth a dull red colour, the fabric being boiled together with powdered aal, castor-oil seeds, and alkaline earth. The dyed cloth, called *kharua*, is said to be immune from the attacks of white ants, and is used by native shopkeepers to wrap up account books.

Aaland or **ALAND ISLANDS.** Group of some 300 isles and rocks at the entrance to the Gulf of Bothnia, forming the Finnish department of Ahvenanmaa. Only about 80 are inhabited; the largest, Aaland, is 18 m. long, and the area of the group is 565 sq. m. Mariehamn is the chief town. The people, mainly of Swedish origin, are skilful sailors and fishermen. Hardy cereals and cattle are raised, and meat, fish, hides, cheese, and butter are exported.

In 1809 Sweden, to whom the islands had long belonged, ceded them to Russia, and since then the question of fortifying them, their position being of great strategic importance, has been the subject of frequent dispute. In 1854,

Abai OR **ABAY**. Abyssinian name of upper Blue Nile, in Egypt, called Bahr-el-Azrek (*q.v.*).

Abana. With Pharpar, one of the rivers of Damascus mentioned in 2 Kings 5. It is the modern Barada (*q.v.*).

Abancay. Town of Peru, cap. of Apurimac dept., in the centre of one of the most fertile basins of the Eastern Andes, where sugar-cane, alfalfa, coffee, and semi-tropical fruits are extensively grown. Labour is cheaply obtained from the indigenous Indians. The town has become increasingly important as a centre of trade in sugar, tobacco, quinine, coffee, and cacao. The basin is drained by the river Apurimac, thence by the Ucayali into the Amazon. Pop. 5,000.

Abandonment (Fr. *à bandon*, at liberty). In law, the surrender of one's rights or privileges. The surrender must be voluntary and with full knowledge of all the circumstances. Coercion or fraud vitiates the abandonment. In legal actions the plaintiff may, at any time before the receipt of the defence, or after such receipt but before taking any other proceedings in the action, wholly discontinue or withdraw, by notice in writing, any part of his action, subject to the payment of costs occasioned by such withdrawal. If further proceedings have been taken, the leave of the court must be obtained, and the court may at any time order such discontinuance, subject to such order as to costs as may be just. A defendant cannot abandon his defence without leave.

There can be no abandonment in proceedings of a criminal nature. A crime is a public wrong which affects the whole community and the prosecution is in the name of the King as representing the community. The person against whom the wrong has been committed cannot elect to abandon the prosecution of the offender. To settle the matter with the wrongdoer is itself a criminal offence—compounding a felony. Where, however, the evidence is clearly insufficient to prove the commission of the offence by the prisoner, the prosecutor may, subject to approval of the judge, offer no evidence. The judge then directs the jury to find a formal verdict of Not Guilty, and the prisoner is discharged. The prisoner cannot be indicted and tried again for the offence. A prosecution may be determined by issuing a *nolle prosequi* by leave of the attorney-general. This usually occurs in cases where a civil

action is pending arising out of the same circumstances as gave rise to the criminal proceedings, or where the defendant is being harassed by the prosecutor presenting defective indictments. A *nolle prosequi* puts an end to the prosecution, but the defendant may be re-indicted and tried for the offence alleged against him.

Things over which a person has ceased to exercise rights of ownership with the intention of abandoning his rights are *res nullius*, nobody's goods, and they become the property of the first person who takes them with the intention of owning them. Goods are not abandoned merely because there is no apparent owner, and when things are lost they do not cease to belong to the owner. The owner has lost possession, but the property of the goods still resides in him. Hence the person who finds a thing has only a right in it until the true owner is found. If the finder keeps it with the intention of owning it, he commits an offence.

It is a criminal offence to abandon any child or young person in such manner as to cause suffering or injury, the seriousness of the crime depending on the circumstances in each case. It may be misdemeanour, punishable on summary conviction, or murder. See Children, Law concerning.

Abano Bagni (anc. *Aponi Fons*). Summer resort of Italy, in the prov. of Padua. It is 6 m. S.W. of the city of Padua, and has hot sulphur springs and mud baths which were famous in Roman times.

Abarim. Mts. of Moab. They are in Transjordan, E. of the Jordan (Num. 27). The word means "of the other side."

Abased (Lat. *ad*, to; late Lat. *bassus*, low). In heraldry, a charge or device placed lower than its customary position on a shield. It is also applied to wings when open but depressed.

Abatement (late Lat. *abattere*, to beat down). Term used in English law in three senses. (a) *Of legacies*, where, if the legacies bequeathed by a will would not leave enough money to pay the testator's debts, the legatees are required to give up part or, if necessary, all their legacies to make up the amount. If a testator dies and leaves £5,000; bequeaths £1,000 to X, and £500 to Y, and the residue to Z, and his debts are £4,000, Z gets nothing; X's legacy is abated by £333 6s. 8d., and Y's by £166 13s. 4d., being the proportion of their legacies to the £500 required. (b) *Of purchase-money*,

where the vendor of land overrepresents the quantity he has to sell. The purchaser can hold him to his bargain with an abatement of the purchase-money. (c) *Of legal proceedings* brought to an end without any decision being arrived at, in which case they are said to be abated.

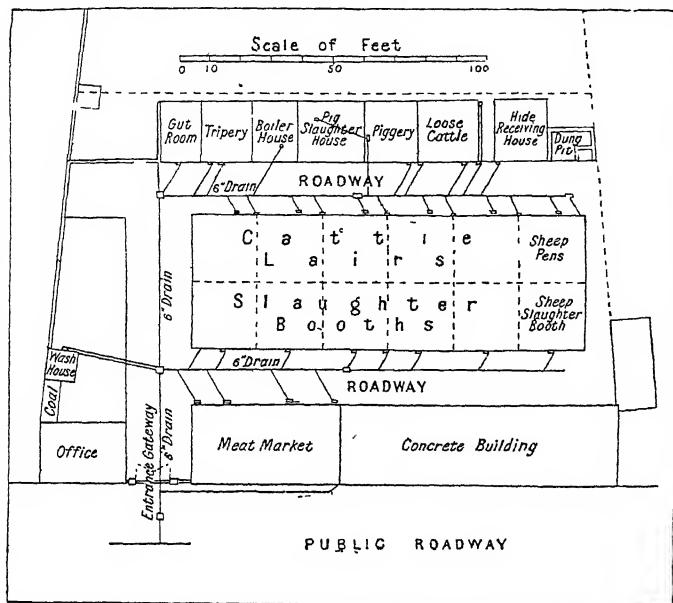
Abatement OR **REBATEMENT**.

In heraldry, a mark rebating or withdrawing the honour of the arms. It is thus applied to symbols of illegitimacy, but more often to imaginary marks invented by the 16th-century heralds—e.g. in an escutcheon reversed sanguine, a blood-red shield placed upside down, assigned to a woman for dishonourable conduct, or to a man for fleeing from the banner of his prince; and the whole shield borne reversed, applied in the case of treason. The last-named is the only abatement, apart from marks of illegitimacy, for which there is any authority. It was applied in courts of chivalry and in tournaments.

Abattis (Fr. *abattre*, to beat down). Military obstacle formed by cutting down trunks of trees, lopping off the small branches, and sharpening the stout ends. These are then placed across a path or approach likely to be taken by the enemy, the butts being anchored to the ground with the spear-like tips facing him. Fixed in a shallow excavation, the obstacle cannot be seen at a distance, and can only by chance be destroyed by artillery, so that the assaulting infantry come unexpectedly upon it. Before wire came into use an abattis was common in field fortifications whenever timber was procurable. At the edges of woods a special form of abattis, called a tree entanglement, is often constructed. Trunks of trees are cut half through, so that the upper portion falls towards the attackers and creates a thick hedge.

Abattoir (Fr.). Public building in which cattle are slaughtered. Various methods of the slaughter of animals for human food have existed from the beginnings of civilization, but there is no reliable evidence of any public abattoirs until the 14th century, when laws governing their use were introduced in England and Germany. Progress in this direction, however, was slow, and the number of public abattoirs in England and Wales was, for a period, not adequate to public requirements.

The private slaughter-house is usually attached to the premises of



Abattoir. Plan of a British provincial abattoir or public slaughter-house built on the booth system usually adopted in the United Kingdom

the meat purveyor. It is frequently nothing more than a shed, with no special design or arrangement. The chief objections to a private slaughter-house are that it is frequently in a crowded thoroughfare, therefore a nuisance from the continual driving of animals to it, and a cause of depreciation in the value of adjacent property. More serious is the impracticability of efficient control and inspection. As a rule, a private slaughter-house consists of only one compartment. It is usually impossible for one butcher to provide a slaughter-house for himself with separate compartments for slaughtering, cleaning the offal, etc.

During the last 40 years many fine public abattoirs have been erected in the United Kingdom by local authorities, and a new department of the engineering profession has been formed in order to provide up-to-date equipment for them. Public abattoirs should be situated conveniently near the cattle market, and, if possible, away from the centre of the town and the principal traffic. The market for dead meat should also be close at hand; in fact, the whole business of the meat industry of the city should be centralized as far as possible. The flooring should be impervious, a complete system of drainage instituted, and an abundant water supply laid on. Within the abattoir two systems of construction are adopted, the

open-hall system and the booth system. In the former the open hall is a large building without any subdivisions, there being nothing inside except the mechanical equipment for slaughtering. In the booth system the hall is divided into separate compartments. This permits privacy in the operations, and the letting of separate booths to individual butchers. In Great Britain the booth system is usually adopted.

During the Second Great War the Ministry of Food concentrated slaughtering in a few abattoirs to economize labour and transport and to control distribution.

A large public abattoir suitable for the needs of a great city will usually consist of the following departments: (1) lairage; (2) slaughtering rooms or halls, subdivided into a hall for cattle, a portion of the same hall for sheep and calves, a hall for pigs, and a hanging-house or cooling-chamber; (3) cold chambers for maturing and storing meat; (4) offal-room and tripe-house; (5) meat inspector's room; (6) room for condemned meat; (7) destructor-room for disposing of condemned meat; (8) engine and boiler house, with steam-boiler, steam-engine, and refrigerating machine; (9) manure depot. See Food, Inspection of. Consult also Public Abattoirs and Cattle Markets, Schwarz.

Abba. Aramaic word meaning father, used three times in the N.T.

(Mark 14; Rom. 8; Gal. 4) in reference to God. As far as is known, the word was restricted to the Deity. It lingers as a title for bishops in the Coptic Church.

Abbadie, ANTOINE THOMSON D' (1810-97). French explorer and scientist. Born in Dublin, of Franco-Irish parentage, he was educated in France and became a naturalized Frenchman. In 1835 he was sent to Brazil by the Académie des Sciences, and travelled in Abyssinia (1838-48). His works include a Geodesy of Ethiopia, a Dictionary of the Amarinna (Amharic) Language, and a Geography of Ethiopia. He left his estate to the Académie des Sciences on condition that it issued a catalogue of 500,000 stars. His younger brother, Armand Michel d'Abbadie (1815-93), published in 1868 an account of their travels called *Twelve Years in Upper Ethiopia*.

Abbas I (c. 1557-c. 1628). Shah of Persia, known as the Great. The son of Shah Mahomed, he succeeded his father in 1586. In 1597, near Herat, he defeated and drove out the Uzbeks. In 1622, aided by an English fleet, he captured the island of Ormuz, diverting its trade to Gomburn, named after him Bender Abbasi, and in 1623 took Bagdad from the Turks. He was an enlightened administrator, though cruel and capricious.



Abbas I, the Great, Shah of Persia

Abbas I (1813-54). Viceroy of Egypt. A son of Tusun Pasha and grandson of Mehmet Ali, he fought under his uncle Ibrahim Pasha in Syria. In 1848 he succeeded Ibrahim as regent, and in 1849, after the death of Mehmet Ali, became Viceroy of Egypt. Cruel and reactionary, he was murdered by two slaves July, 1854.

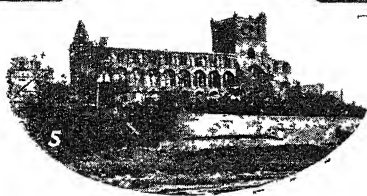
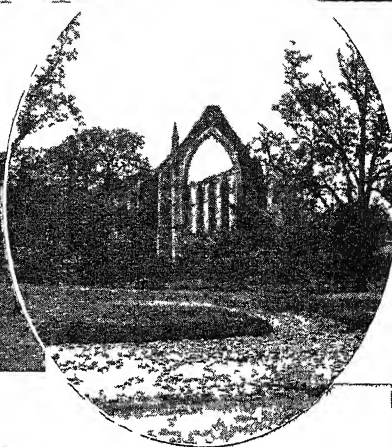
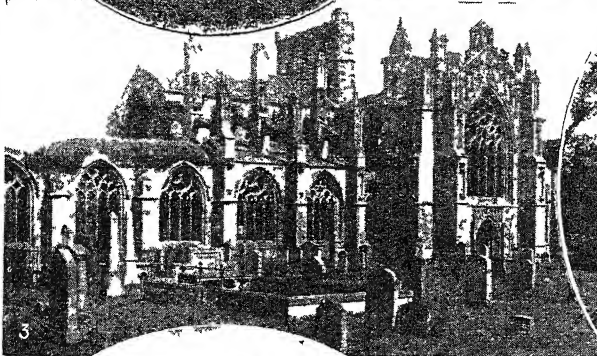
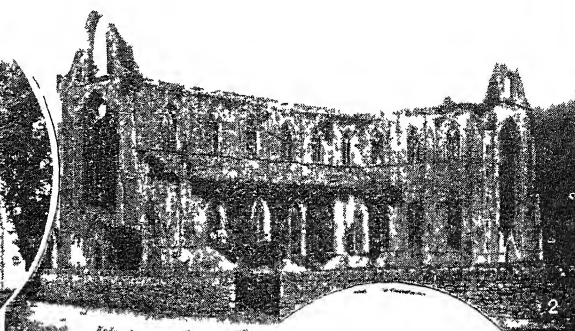
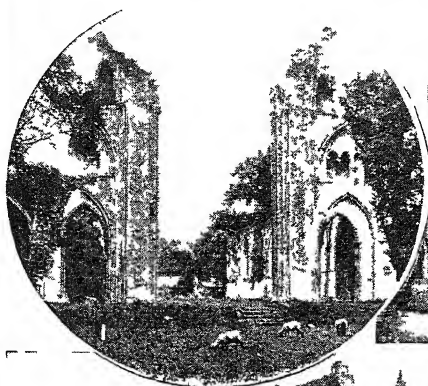
Abbas II OR ABBAS HILMI (1874-1944). Last Khedive of Egypt. The eldest son of Tewfik Pasha, whom he succeeded in 1892,



Abbas II, Khedive of Egypt, 1892-1914

he received a western education. Becoming reconciled to foreign control, he took a considerable interest in the social and economic improvement of

Abbey Plan of the Benedictine monastery of St Gall, built about 820 The church, which has an apse at each end, is surrounded by the buildings of a self-contained community



1 Glastonbury Abbey Somersetshire, Benedictine house once covering 60 acres 2 Tintern Abbey, Cistercian foundation near Chepstow, Monmouthshire 3 Melrose Abbey, Roxburghshire another Cistercian building

famous for carvings and traceries 4 Bolton Abbey, near Skipton, Yorkshire founded by Augustinians 5 Jedburgh Abbey Roxburghshire Augustinian 6 Fountains Abbey Cistercian edifice near Ripon Yorkshire

ABBEY: RUINS OF GREAT MONASTIC BUILDINGS IN ENGLAND AND SCOTLAND

date from S. Benedict (6th century), under whose rule they are generally formed, though in the East they are found far earlier. Of no particular style in architecture in the beginning, a common form came later into use—a quadrangle, with open cloisters on each side, various buildings adjoining the cloisters, and a big church, either on the N. side to afford shelter from cold winds, or, in milder climates, on the S. side to give shade from the sun. Adjoining the cloisters of the larger abbeys were the oratory, the dormitory containing the cubicles of the monks, the refectory or dining-hall, the kitchen, workshops, infirmary, novice-house, chapter-house, and cellars for stores. A school for boys was held in the cloisters or, as at Durham, in a separate building.

As hospitality was an essential feature of the rule of S. Benedict, every abbey had at least one guest-house, situated within the enclosed grounds, though generally apart from the monastery proper. While the abbot was the absolute authority, in a large community of 100 or more monks his authority had to be delegated in many matters of daily routine, and the following were the chief officials at the important abbeys: the precentor, responsible for the singing in the church services, who was also choirmaster, librarian, and in some cases master of the boys' school; the sacrist, to whom was committed the care of the church fabric, with the sacred plate and vestments, and whose duty it was to see to the lighting throughout the entire abbey; the cellarer, who was responsible for the supply of food, drink, and fuel for the community; the kitchener, upon whom it fell to see to the serving of meals and an adequate distribution of the food; the infirmarian, who tended the sick; the almoner, who distributed alms and food to the poor; the chamberlain, whose duty it was to see to the clothing of the brethren; the novice-master, responsible for the training of all who sought admission to the order; and the guest-master, upon whom devolved the care of the guest-house and the due maintenance of hospitality.

The abbey was a centre of in-



Abbey Theatre, Dublin. This unpretentious building became in 1904 the home of modern Irish drama

dustrial, a place of learning and a self-supporting, self-contained community; and the abbots of all the larger abbeys were landlords on an extensive scale, with seats in Parliament. The cathedrals of Durham, Gloucester, Norwich, Chester, Worcester, and Canterbury, Westminster Abbey, the abbey churches of Bath and Tewkesbury, and the ruins of Kirkstall, Melrose, and Tintern reveal the architectural beauty of the British abbey of the Middle Ages. Of the modern English abbeys, Downside in Somerset, Ampleforth near York, and the Cistercian abbey of Buckfastleigh in Devon are among the more important. *See Monasticism. Consult English Monastic Life, F. A. Gasquet, 1904; English Monks and the Suppression of the Monasteries, G. Baskerville, 1937.*

Abbey, EDWIN AUSTIN (1852-1911). American painter. Born in Philadelphia, April 8, 1852, he first attracted notice by his black-and-white drawings in Harper's Magazine and other periodicals. Settling in London in 1881, he was elected A.R.A. in 1896 and R.A. in 1898. His chief oil paintings are Richard Duke of Gloucester and the

Lady Anne, 1896, and the official picture of the Coronation of Edward VII, 1904. He died at Chelsea, Aug. 1, 1911. The exquisite technique of his work as an illustrator in black and white will probably longest preserve his memory.

Abbey Theatre. Dublin playhouse built by Miss A. E. F. Horniman (*q.v.*) for the Irish National Theatre Society. The Irish Literary Theatre was founded in 1898 with the object of producing plays of Irish life of a kind not commonly seen on the commercial stage. In 1903 it developed into the Irish National Theatre, producing at St. George's Hall, London, plays by W. B. Yeats and Lady Gregory. In 1904 Miss Horniman opened the Abbey Theatre in Dublin for the free use of the I.N.T.S. Here the plays of Yeats, Edward Martyn, "A. E." (George Russell),

George Moore, Padraic Colum, Lady Gregory, Douglas Hyde, and Norreys Connell attracted an interested public. The fame of the Abbey Theatre spread with the production of J. M. Synge's plays of Irish peasant life, *e.g.* *The Shadow of the Glen*, *Riders to the Sea*, *The Well of the Saints*, and *The Playboy of the Western World*. Sean O'Casey contributed to some of the theatre's greatest successes with his *Juno and the Paycock* (1924) and *The Plough and the Stars* (1926). Other dramatists represented in the theatre included Lennox Robinson, St. John Ervine, Bernard Shaw, Denis Johnston, and Paul Vincent Carroll.

Abbot (Aramaic *abba*, father). Title given in the West, not earlier than the 6th century, to the superior of a monastery of twelve or more monks. Within his own jurisdiction he had the authority and insignia of a bishop. Before the dissolution of the



Abbot. Brass of Thomas de la Mare, abbot of St. Albans (1349-1398). From the 12th century abbots adopted the episcopal insignia of mitre, ring, gloves, and crozier



Edwin A. Abbey, American painter. Elliott & Fry

monasteries mitred abbots formed the majority of the lords spiritual in the English Parliament. An abbot is elected, by the votes of the professed members of the community, for life. An abbot president is elected by the abbots of the federated houses of the particular order in each land. The election must be confirmed by the bishop of the diocese, or, if the house be exempt, as Westminster Abbey was, by the Pope. When the greater monasteries possessed large estates the abbot had all the authority of a lord of the manor. In Germany certain abbots—e.g. the abbot of Fulda—had sovereign powers.

Abbot, GEORGE (1562-1633). Archbishop of Canterbury. Born at Guildford in Oct., 1562, the son of a cloth-worker, he was educated at Guildford Grammar School and at Oxford, where he was thrice vice-chancellor. In 1609 he was appointed bishop of Coventry and Lichfield, in 1610 bishop of London, and in 1611 archbishop of Canterbury.



George Abbot,
English Primate

In 1621, while hunting, he accidentally killed a keeper, and an inquiry was instituted into the conduct of a prelate who had committed involuntary homicide while

engaged in so unclerical a pursuit. The inquiry fell to the ground, but left Abbot under a cloud. He died at Croydon in Aug., 1633. Abbot was a pronounced puritan, and as such the prosecutor of both Roman Catholics and Nonconformist Protestants.

Abbot, ROBERT (1560-1617). English divine. Elder brother of George Abbot, archbishop of Canterbury, he was educated at Guildford Grammar School and at Balliol College, Oxford, of which he became master. A famous preacher, he was successively chaplain



Robert Abbot,
English bishop

to James I, regius professor of Divinity at Oxford, and bishop of Salisbury. He wrote against Roman Catholic teaching and in defence of the Reformation, also a reply to Bellarmine on the royal supremacy, and a Latin treatise on the Gunpowder Plot.

Abbot, THE Twelfth of Sir Walter Scott's Waverley Novels. A sequel to *The Monastery*, with which the author connected it by making Edward Glendinning the last abbot of Melrose. Its chronology is at variance with history, but its intensely sympathetic study of Mary Queen of Scots ensures it a permanent place in historical fiction. The novel was first published in Sept., 1820.

Abbot of Unreason OR LORD OF MISRULE. Name given to the master of the revels in medieval times. He was chosen by election at times of festivity, particularly Christmas. At Oxford, Cambridge, the Inner Temple, and Gray's Inn he had charge of the Christmas revels, arranged the Latin plays, and acted as master of the ceremonies. His counterpart in certain French towns was called the Abbé de Liesse. Other names for an official with like authority were Abbas Stultorum, or Abbot of Fools, Abbé de la Maligne, and, in Scotland, Master of Unreason. At certain festive seasons the ordinary rules of life were relaxed, and under the direction of a master, a condition of misrule, unreason, folly, topsy turvydom, prevailed.

Abbotsbury. Village of Dorset, England, 10 m. S.W. of Dorchester. Here is the largest swannery in the U.K., covering 25 acres. Pop. 552. See Swan.

Abbotsford. Residence of Sir Walter Scott. Built 1811-24, it is on the right bank of the Tweed,



Abbotsford. Sir Walter Scott's picturesque home near Melrose

3 m. W. of Melrose Abbey. A part of the building has been converted into a museum containing relics of the novelist.

Abbots Langley. Parish and village of Hertfordshire, England. It is 21 m. N.W. of London by L.M.S. Rly. Once a manor of St. Albans Abbey, its church of S. Lawrence contains Norman remains. Nicholas Breakspear, afterwards Pope Adrian IV was born here. Pop. 3,909.

Abbott, EDWIN ABBOTT (1838-1926). British scholar and schoolmaster. Educated at the City of London School and St. John's Col-

lege, Cambridge, Abbott was senior classic in 1861 and afterwards fellow of his college. Having been ordained, he became a schoolmaster, and during 1865-89

was head master of his old school. He wrote sermons, works on divinity text-books for schools, and a Shakespearean Grammar, probably his most popular work. Made a fellow of the British Academy, 1913, he died Oct. 12, 1926.

Abbott, SIR JOHN JOSEPH CALDWELL (1821-93). Prime Minister of Canada.



Sir John Abbott,
Canadian Premier

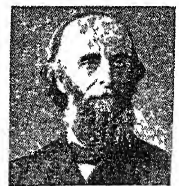
The son of a clergyman, he became a successful lawyer, and before the Federation of 1867 was a member of the Canadian Parliament and solicitor-general. After 1867 Abbott became a follower of Sir John A. Macdonald, whose cabinet he joined in 1887. In 1891 he succeeded Macdonald as prime minister, but resigned Dec., 1892, and died Oct. 30, 1893.

Abbott, LYMAN (1835-1922). American Congregational divine and publicist. Born Dec 18, 1835 at Roxbury, Massachusetts, he graduated at New York University in 1853, and became pastor at Terre Haute, Indiana, in 1860. In 1888 he succeeded Henry Ward Beecher as minister at Plymouth Church, Brooklyn. In 1893 he became chief editor of *The Outlook*, New York. His books include *A Life of Henry Ward Beecher*; *Dictionary of Religious Knowledge* (with T. J. Conant); *Life and Literature of the Ancient Hebrews*. He died Oct. 22, 1922.

Abbottabad. Chief town of Hazara dist., N.W. Frontier province, Pakistan. It is 63 m. N. of Rawalpindi, and is a military centre. It was named after General Sir James Abbott (1807-96), who was commissioner of Hazara 1845-53. Pop. 8,000.



Edwin A. Abbott,
British scholar
Elliott & Fry



Lyman Abbott,
American divine

ABBREVIATIONS: A CLASSIFIED GUIDE

Over 3,700 abbreviations are here grouped in four sections. As certain abbreviations may have different meanings in different sections, all sections should be consulted for a particular meaning. The lists include all abbreviations used throughout this Encyclopedia.

Abbreviations (Latin *ad*, to; *brevis*, short) are commonly used in both speech and writing to save time and space, though abbreviated forms of proper names, either of persons or of places, may also express affection. Examples are found in Greek, Latin, and other MSS., in ancient inscriptions, and on early medals and coins as on modern ones. Their use has been greatly extended in modern speech and writing. Everyone can and does abbreviate words as he pleases, the only requisite being that the meaning should be understood by those addressed. Hence such contractions in correspondence as *ysr* *ffly* and the economical devices resorted to in newspaper advertisements paid for by the line. Many abbreviations, although more formalised, are of no more than local or transitory significance. Others are of importance only to specialised groups or in connexion with specialised activities, e.g. those used by such bodies as the Freemasons and those used in the printing of knitting instructions or chess problems.

On the other hand, many words have become more familiar in their shortened than in their full

SECTION I General Abbreviations

SECTION II (p. 17 *et seq.*) Associations, Institutions, Titles, Honours, Degrees

SECTION III (p. 21 *et seq.*) War, the Services, Civil Defence

SECTION IV (pp. 26-27) Scientific and Technical

form. Such abbreviations as *bus*, *cab*, *cello*, *maths*, *memo*, *per cent*, *perm*, *phone*, *photo*, *piano*, *pram*, *pub*, *taxi*, and *zoo* require no explanation, being almost accepted as words in their own right. Occasionally an abbreviated form has even acquired a different meaning from that of the full word: thus *navy* is not now a synonym for *navigator*, nor does the colloquial English *blitz* carry precisely the same connotation as the German parent word *Blitzkrieg*.

To the use of initial letters as a form of abbreviation there is no apparent limit. Their popularity has long been a source of jest. In modern times various commercial and industrial firms have been alert to the advantage of using initials in advertising, thereby swelling beyond all computation the number of initial-letter abbreviations now in common currency.

No list of abbreviations, therefore, could ever be called complete. But the list given here does claim to be thoroughly comprehensive in that it gives the standard form of every accepted current abbreviation that the average person may expect to meet or require to use.

Section I. GENERAL ABBREVIATIONS

This section consists of such abbreviations as are likely to be used, heard, or seen every day in business or social intercourse or in general reading—of a newspaper, for example—and do not fall more properly into any of the other three sections. A few of the commoner forms in daily use, e.g. *B.B.C.* and *R.A.*, are included in both Section I and Section II: but, as a rule, absence of any particular abbreviation from Section I should suggest reference to one of the other sections.

A. Ace (cards); adults only (cinema); advance (clock); answer.
a. Accepted; acre(-s); active (grammar); alto; approved.
A. & M. Hymns Ancient and Modern.
A.B. Able-bodied seaman.
abbrev. Abbreviation (-ated).
A.B.C. (Depot of) Aerated Bread Company.
ab init. *Ab initio* (Latin), from the beginning.
abl. Ablative.
Abp. Archbishop.
abr. Abridged.
abs. Absent; absolute(-ly); abstract.
A.C. Alternating current; Appeal Court.
ac. Acre(-s).
a/c. Account.
acc. Acceptance; according (to); accusative.
accel. *Accelerando* (Italian), becoming quicker.
A.C.I. *Assuré contre l'incendie* (French), assured against fire.
ack(-d). Acknowledge(-d).
Act. Actuary.
A.D. *Anno Domini* (Latin), in the year of the Lord.
ad. Advertisement.

a.d. After date.
ad fin. *Ad finem* (Latin), towards the end.
ad inf. *Ad infinitum* (Latin), to infinity.
ad int. *Ad interim* (Latin), in the meantime.
ad lib. *Ad libitum* (Latin), as desired.
ad loc. *Ad locum* (Latin), at the place.
Adv. Advent.
adv. Advance(-d); adverb; advocate.
adv., ad val. *Ad valorem* (Latin), to the value.
adv. Advertisement.
A.E. Adult education.
A.E.C. Associated Equipment Company.
Aen. The Aeneid.
aet., aetat. *Aetatus* (Latin), aged.
A.F. Anglo-French.
aff. Affidavit.
Afr. Africa(-n).
aft. Afternoon.
agric. Agriculture.
agt. Agent.
A.H. *Anno Hegirae* (Latin), in the year of the Hegira (Mahomet's flight from Mecca, A.D. 622).
A.I.D. Artificial insemination by a donor.

Ala. Alabama.
Alas. Alaska.
Alld. Alderman.
Alg. Algebra.
A.L.S. Autograph letter, signed.
alt. Alternative(-ly); altitude.
Alta. Alberta.
A.M. Alpes-Maritimes; Ave Maria (Latin), Hall Mary.
a.m. *Ante meridiem* (Latin), before noon.
A.M.D.G. *Ad maiorem Dei gloriam* (Latin), to the greater glory of God.
amdt. Amendment.
A.N. Anglo-Norman.
an. Anna (coin).
a.n. Above-named.
anal. Analogous; analysis.
Anat. Anatomy.
anc. Ancient(-ly).
Angl. Anglican.
Ann. Annals; annual; annuities.
Anon. Anonymous.
ans. Answer.
ant. Antiquity; antonym.
a.o. Account of.
A.P. Alexandra Park (racing); Amalgamated Press; ante-post (betting); arithmetical progression; Associated Press.

ap. *Apud* (Latin), in the work of.
a.p. Above proof; author's proof.
Apocr. Apocrypha.
apos. Apostrophe.
app. Apparent; appendix; appointed.
appl. Appeal (legal); applicable.
appro. Approval.
approx. Approximate(-ly).
appx. Appendix.
Apr. April.
aq. *Aqua* (Latin), water.
Ar. Arab. Arabic.
A.R. *Anno Regni* (Latin), in the year of the reign of; annual return.
ar. All risks.
arch. Archaic; archery; archipelago; architect(-ure).
Archd. Archdeacon; archduke.
Ariz. Arizona.
Ark. Arkansas.
arr. Arranged (by); arrives; *arrondissement* (French civic division).
art. Article; artificial.
As. Asia(-tic).
A.S. Account sales; Anglo-Saxon.
A.S.S.R. Autonomous Soviet Socialist Republic.

- atm. Atmospheric.
a.t.s. At the suit of.
Att. Attaché; attorney.
att. Attached.
A.U.C. *Anno urbis conditae* (Latin), in the year of the founding of the city (Rome, 753 B.C.).
Aud. Auditor.
Aug. August.
aug. Augment.
aux. Auxiliary.
A.V. Authorised Version.
av. Average.
a.v. *Ad valorem* (Latin), to the value.
avdp. Avoirdupois.
Ave. Avenue.
az. Azure (heraldry).
- B. Bay; black (pencils).
b. Bachelor; bass (music); bay (horse); belga; born; bowled; boy; brother; bye(s) (cricket).
B.A. Buenos Aires.
Bah. Bahamas.
bal. Balance.
Balt. Baltic; Baltimore.
b. & b. Bed and breakfast.
b. & s. Brandy and soda.
bap. Baptized.
Bapt. Baptist.
Bar. Book of Baruch.
bar. Barometer.
Barb. Barbadoes.
Bart's. S. Bartholomew's Hospital, London.
B.A.W. Back axle weight.
B.B. Bitter and Burton.
B.B.C. British Broadcasting Corporation.
B.C. Before Christ; British Columbia.
Bd. Board; bond.
b.e. Bill of exchange.
B.E.A. British East Africa.
B.E.C.C. British Empire Cancer Campaign.
Beds. Bedfordshire.
Berks. Berkshire.
b.f. Beer firkin; brought forward.
B.G. Birmingham gauge.
B.Gu. British Guiana.
B.Hond. British Honduras.
B.I. British India.
Bib. Biblical; bibliography.
Biog. Biography.
Biol. Biology.
Bk. Bank.
Bkg. Banking.
B.L. Bill of lading; black letter (type).
B.M. *Beata Maria* (Latin), Blessed Mary; *beatae memoriae* (Latin), of blessed memory; bench mark; British Monomark; British Museum.
b.m. Board measure.
B.M.I. British Medical Journal.
B.O. Body odour; branch office.
b.o. Broker's order; buyer's option.
B. of E. Bank of England.
bol. Bolus.
B.O.P. The Boy's Own Paper.
bor. Borough.
B.O.T. Board of Trade.
bot. Botanical; bottle; bought.
Bp. Bishop.
B.P. British Pharmacopoeia; British public; Baden-Powell (Baron).
b.p. Below proof; bill payable; boiling point.
bpl. Birthplace.
B.Q. *Bene quiescat* (Latin), may he rest well.
Br. Breton; bridge; British; brother.
B.R. British restaurant.
- b.r. Bill receivable.
Brec. Breconshire.
brms. Bedrooms.
Bros. Brothers.
b.s. Balance sheet; bed-sitting (room); bill of sale.
B.S.A. Birmingham Small Arms Company; British South Africa.
B.S.T. British summer time.
B.T.E. British-Thomson-Houston.
B.Th. U. British thermal unit.
bu(-s). Bushel(-s).
Bucks. Buckinghamshire.
B.U.P. British United Press.
B.V.M. *Beata Virgo Maria* (Latin), Blessed Virgin Mary.
B.W.I. British West Indies.
Byz. Byzantine.
- C. Cape; Centigrade; centre (stage); Chancellor; club (cards); cold (tap); Conservative; Consul; one hundred (Roman).
c. Caught (cricket); cent(-s); centime(-s); *citra* (Latin), about; *citra* (Latin), against; contralto.
C.A. Central America; Court of Appeal.
C/A. Capital account.
ca. *Circa* (Latin), about.
cal. Calendar; calorie.
Calif. California.
Cams. Cambridgeshire.
Can. Canada; Canon; *cantor* (Latin), of the choir.
Canpac. Canadian Pacific Railway.
Cant. Canticles (Song of Solomon).
Cantuar. *Cantuariensis* (Latin), of Canterbury (Abp.'s signature).
cap. Capital letter; chapter; number of an Act of Parliament.
car. Carat.
Cards. Cardiganshire.
Carliol. *Carloliensis* (Latin), of Carlisle (Bp.'s signature).
Cas. Castle.
Cath. Cathedral; Catholic.
C.C. Cape Colony; Circuit Court; Civil Court; County Council(-lor); County Court; curate in charge.
cc. Chapters.
c.c. Contra credit; cubic centimetre(-s); cubic contents.
C.C.C. Central Criminal Court.
C.C.P. Court of Civil Procedure.
C.Cr.P. Court of Criminal Procedure.
C.D. Civil death; contagious diseases.
c.d. With dividend.
C.E. Chief engineer; civil engineer; Church of England.
Cels. Celsius.
Cent. Centigrade; Central; century.
cert. Certainty; certificate.
Cestr. *Cestriensis* (Latin), of Chester (Bp.'s signature).
cet. par. *Ceteris paribus* (Latin), other things being equal.
cf. *Confer* (Latin), compare.
c.f. Carried forward.
c.f.i. Cost, freight, insurance.
C.G. Centre of gravity; coastguard.
cg. Centigramme(-s).
Ch. Chancery; chaplain; chief; church.
ch. Chain (measure); champion (dogs); chapter; child.
- cha. Chapel.
Chron. Book of Chronicles.
C.I. Cast iron; Channel Islands.
Cicestr. *Cicestriensis* (Latin), of Chichester (Bp.'s signature).
C.I.D. Criminal Investigation Department.
Cie. *Compagnie* (French), company.
c.i.f.(c). Cost, insurance, freight (commission).
circ. *Circiter* (Latin), about.
cl. Centilitre(-s); class; classical; clause.
Clar. Clarinet.
C.L.P.A. Common Law Procedure Act.
C.M. Common measure (music).
cm. Centimetre(-s).
C.M.D. Common measure double.
Cn. Canon (law).
C.N.R. Canadian National Railways.
C.O. Colonial Office; conscientious objector; Crown Office.
co. Company; county.
c/o Care of.
C.O.D. Cash on delivery; Concise Oxford Dictionary.
C. of E. Church of England.
C. of S. Church of Scotland.
Col. Epistle to the Colossians.
col. College; colon (currency); colour; column.
coll. College.
coll. Collect(-ion); colloquial.
Colo. Colorado.
Com. Commissioner; committee; Communist.
comp. Comparative; compositor; compound.
Con. Conics; Consul.
con. *Contra* (Latin), against.
cond. Conditional.
Conf. Conference; Confucius.
Cong. Congregational(-ist); Congress.
conj. Conjugation; conjunction.
Conn. Connaught; Connecticut.
Cons. Conservative.
cons. Consonant.
Consols. Consolidated Funds.
Cor. Corinthian (architecture); *Cornu* (Latin), horn (music); Epistle to the Corinthians.
corr. *Corrigenda* (Latin), corrections to be made.
cox. Coxswain.
coy. Company.
C.P. Cape Province; Carter Paterson; Central Provinces (India); chromium plated; Civil Procedure; Common Prayer; Communist Party; concert party.
c.p. Candle power; carriage paid.
C.P.R. Canadian Pacific Railway.
Cr. Creditor; Crown.
cr. Created; crown (paper size).
Cres. Crescent.
cresc. *Crescendo* (Italian), becoming louder.
crim. con. Criminal conversation (adultery).
Cr. P. Criminal Procedure.
ct. Court.
C.S. Chief Secretary; Civil Service.
cs. Cases (commerce).
cts. Centimes; cents.
cu. cub. Cubic.
C.U.P. Cambridge University Press.
- c.v.d. Cash against documents.
C.W. Common Wealth.
c.w.o. Cash with order.
C.W.S. Co-operative Wholesale Society.
cwt. Hundredweight.
cyl. Cylinder.
- D. *Deus* (Latin), God; diamond (cards); *Dominus* (Latin), the Lord; five hundred (Roman).
d. Daughter; day; delete; *denarius* or *denarii* (Latin), penny or pence; died; discharged.
δ *Deletatur* (Latin), let it be deleted.
D.A. Deposit account; District Attorney (U.S.A.).
d.a. Days after acceptance.
dag. Decagramme(-s).
D.A.H. Disordered action of the heart.
dal. Decalitre(-s).
dam. Decametre(-s).
Dan. Danish.
dat. Dative.
D.B. Domesday Book; double-breasted.
D.B.S.T. Double British Summer Time.
d.b. Day book.
D.C. *Da capo* (Italian), from the beginning; direct current; District Court; District of Columbia.
D/D. Dated.
d.d. Days after date; day's date.
Deb. Debenture.
deb. Débutante.
Dec. *Decani* (Latin), of the Dean; December; Decorated (architecture).
dec. Decagon(-al); deceased; declaration; declension; declination; *decrecendo* (Italian), becoming quieter.
Def. Deferred (shares).
deg. Degree(-s).
D.E.I. Dutch East Indies.
Del. Delaware.
del. Delegate; delete, *delevit* (Latin), he drew.
dele. Delete.
dep. Departs; deponent (grammar); deposed; deputy.
dept. *Département* (French civ. division); department.
det. Detached.
Deut. Book of Deuteronomy.
D.F. Defender of the Faith.
d.f. Double-fronted.
D.G. *Dei gratia* (Latin), by the grace of God.
dg. Decigram(-s).
D.H. De Havilland.
diam. Diameter.
dim. *Diminuendo* (Italian), becoming quieter; diminutive.
din. Dinar.
dis. Disconnect(-ed); discount(-ed); distribute (type matter).
disc. Discovered; discount(-ed).
dist. Distance; distinguish; district.
Div. Divine.
div. Dividend; division; divorced.
divi. Dividend.
dl. Decilitre(-s).
dm. Decimetre(-s).
D.N.B. Dictionary of National Biography.
D.O. Demi-official; direct order; district office; Dominions Office.

- do. Ditto.
dols. Dollars.
Dom. Dominion; *Dominus* (Latin), the Lord.
D.O.M. *Dominus omnium* *maister* (Latin), God, the Lord of all.
D.O.R.A. Defence of the Realm Act.
doz. Dozen.
Dr. Debtor; doctor.
D.R. Dead reckoning; Defence Regulation; District Railway.
dr. Drachma; dram(-s); drawer (of cheque).
d.s.p. *Decessit sine prole* (Latin), died without issue.
D.T. *Delirium tremens*.
dub. Dubious.
Dunelm. *Dunelmensis* (Latin), of Durham (Bp.'s signature).
D.V. *Deo volente* (Latin), God willing.
dwt. Pennyweight.
Dyn. Dynamics.
- E. East; electorate.
e. Eldest.
E. & O. E. Errors and omissions excepted.
Ebor. *Eboracensis* (Latin), of York (Abp.'s signature).
E.C. Earth closet; East Central; Episcopal Church.
E.C.A. Economic Cooperation Administration.
Ecol. Book of Ecclesiastes.
eclcs. Ecclesiastical.
Eclcs. Book of Ecclesiastical.
Ed. Editor.
ed. Edited; edition.
E.E. Early English, electrical engineer; employment exchange; errors excepted.
Eg. Egyptian.
e.g. *Exempli gratia* (Latin), for the sake of example.
E.H. English Hymnal.
E.I. East Indies.
el. Elected; electricity; element.
Eliz. Elizabeth(-an).
Emb. Embankment; Embassy.
E.M.I. Electrical and Musical Industries.
E. N. & T. Ear, nose, and throat.
E.N.E. East-North-East.
Eng. Engineering; England; English.
engr. Engineer; engraver.
Ent. Entered at; entomology.
Ep. Epistle.
E.P. Electro-plated.
E.P.A. Emergency Powers Act.
E.P.D. Excess Profits Duty.
Eph. Epistle to the Ephesians.
episc. Episcopal.
E.P.N.S. Electro-plated nickel silver.
E.P.T. Excess Profits Tax eq. Equal.
E.R. Bad Riding; *Eduardus Rex* (Latin), King Edward; *Elisabetha Regina* (Latin), Queen Elizabeth.
et. Elder.
E.R.F. European Recovery Programme.
E.S.E. East-South-East.
esp. Especially.
Esq. Esquire.
est. Established; estimated.
estab., estd. Established.
Esth. Book of Esther.
et al. *Et alia* (Latin), and other things.
- etc. *Et cetera* (Latin), and other things.
et seq. *Et sequens* (Latin), and the following.
Euc. Euclid.
evg. Evening.
Ex. Book of Exodus; exchange.
ex. Example; exercise; extra.
exc. Excellent; except; *excudit* (Latin), he engraved.
Exch. Exchange; Exchequer.
excl. Excluding.
exec. Executed.
ex. lib. *Ex libris* (Latin), from the books.
Exol. Book of Exodus.
ex o. *Ex officio* (Latin), by virtue of office.
Exon. *Exoniensis* (Latin), of Exeter (Bp.'s signature).
exor. Executor.
exp. Export(-s); express.
ex(x). Executor(-trix).
ext. Extension; exterior; external; extinct; extract.
Ezek. Book of Ezekiel.
- F. *Fahrenheit*; fair; female; firm (pencils); the Folio Shakespeare.
f. Farthing(-s); father; fathom(-s); feminine; focus; foot or feet; *forte* (Italian), loud; function (maths.); furlong(-s).
F.A. Financial adviser.
f.a.a. Free of all average.
F.A.F. Fresh Air Fund.
Fahr. *Fahrenheit*.
fam. Familiar(-ly); family.
far. Farriery; farthing.
f.a.s. Free alongside ship.
F.A.W. Front axle weight.
F.B. Fire brigade.
F.B.H. Fire brigade hydrant.
F.C. Free Church (Scotland).
f.co. Fair copy.
fc. Foolscap.
f.c.s. Free of capture and seizure.
F.C.T. Federal Capital Territory.
F.D.R. Franklin Delano Roosevelt.
Feb. February.
Fed. *Fecit* (Latin), he made.
Fed. Federalist; federated.
Fedn. Federation.
fem. Feminine.
FF. Fianna Fail.
ff. Folios; following pages; *fortissimo* (Italian), very loud.
F.G. Fine Gael.
f.g.a. Free of general average.
F.H. Fire hydrant.
F.I.A.T. *Fabbrica Italiana Automobile Torino* (Italian motor factory at Turin).
fict. Fictitious.
Fid. Def. *Fidei Defensor* (Latin), Defender of the Faith.
fig. Figurative(-ly); figure.
fir. Firkin.
Fl. Flute.
fl. Florin; *floruit* (Latin), he flourished; fluid.
Fla. Florida.
fm. Farn; fathom.
F.M.D. Foot and mouth disease.
F.M.S. Federated Malay States.
f.n. Footnote.
fnd. Founded.
fndr. Founder.
F.O. Foreign Office; full organ.
fo(l). Folio.
f.o.b. Free on board.
foll. Following.
- for. Foreign; former(-ly).
f.o.r. Free on rail.
f.o.s. Free on station.
F.P. Fine paper; footpath.
fp. *Forse piano* (Italian), loud then soft.
f.p. Fire plug; foot pound(-s); freezing point.
f.p.a. Free of particular average.
Fr. Father; franc(-s); France or French; *Frau* (German), Mrs.; friar.
Fri. Friday.
Fri. *Fraulein* (German), Miss.
F.S. *Faire suivre* (French), please forward; Financial Secretary.
ft. Fort.
ft. Feint; foot or feet.
fur. Furlong(-s); furnished fut. Future.
f.v. *Folio verso* (Latin), on the back of the page.
F.W.A. Factories and Workshops Act; French West Africa.
F.W.B. Four wheel brakes.
fwd. Forward.
- G. Germany; Gulf.
g. Good; grain(-s) (weight); gramme(-s); gravity; girl; guinea.
Ga. Georgia.
Gael. Gaelic.
Gal. Epistle to the Galatians.
gal(l). Gallon.
Gall. Gallery.
G. & S. Gilbert and Sullivan.
Gaz. Gazette.
G.B. Great Britain.
G.B.S. George Bernard Shaw.
G.C. Gold Coast.
G.C.F. Greatest common factor.
G.C.M. Greatest common measure.
g.e. Gilt-edged.
G.E.C. General Electric Company.
Gen. Book of Genesis.
gen. Gender; genitive; general(-ly); genus.
Ger. German(-y).
Ges. *Gesellschaft* (German), company or society.
Gestapo. *Geheime Staatspolizei* (German), State secret police.
G.G. Girl guides.
G.I. Government of India.
G.J.C. Grand Junction Canal.
Gk. Greek.
Gl. Gloria.
Glam. Glamorgan-shire.
Glos. Gloucestershire.
gm. Gramme(-s).
G.M.B. Good merchantable brand.
G.M.T. Greenwich mean time.
gns. Guineas.
G.O.M. Grand Old Man (originally W. E. Gladstone).
Gov. Government; Governor.
govt. Government.
G.P. General paralysis; general pause (music); general practitioner; general purposes; geometrical progression; *Gloria Patri* (Latin), glory be to the Father; grand passion; great primer.
G.P.I. General paralysis of the insane.
G.P.O. General post office.
Gr. Greek.
G.R. General reserve; *Georgius Rex* (Latin), King George.
gr. Grain(-s) (weight); gramme(-s); gravity.
- G.R.I. *Georgius Rex Imperator* (Latin), George King and Emperor.
gro. Gross (144).
gs. Guineas.
g.s. Grandson.
gt. Great.
gu. Guinea; gules (heraldry).
Guar. Guaranteed.
G.W.R. Great Western Railway.
gym. Gymnastics; gymnasium.
gyp. Gypsophila.
- H. Hard (pencils); heart (cards); herring (films); hot (tap); hydrant.
h. *Hodgins*; hour(-s); hundred; husband.
Hab. Book of Habakkuk.
hab. *Habitat* (Latin), he lives.
Hag. Book of Haggai.
h. & c. Hot and cold water.
Hants. Hampshire.
H.B. Hard black (pencils).
H.C. House of Commons; House of Correction.
h.c. *Honoris causa* (Latin), a way of honouring.
H.C.F. Highest common factor.
h(d)cp. Handicap.
Heb. Epistle to the Hebrews; Hebrew.
hept. Heptagon(-al).
her. Heraldic.
Herts. Hertfordshire.
hex. Hexagon(-al).
HF. Hard firm (pencils).
htbd. Half-bound.
htcf. Half-calf.
htcl. Half-cloth.
H.G. High German; Holy Ghost.
hg. Hectogramme(-s); heliograph.
hhd. Hogshead.
hil. Hilary.
H.J.(S). *Hic jacet (sepultus)*, (Latin), here lies (buried).
H.K. Hong Kong; House of Keys.
H.L. House of Lords.
hl. Hectolitre(-s).
H.M. Headmaster.
hm. Hectometre(-s).
H.M.C. Headmasters' Conference; His Majesty's Customs.
H.M.P. Hand-made paper; *hoc monumentum posuit* (Latin), he erected this monument.
H.M.S. His Majesty's Service; His Majesty's ship.
H.M.T. His Majesty's tawler.
H.M.V. His Master's Voice.
Ho. House.
H.O. Head Office; hold over; Home Office.
Hon. Honorary; Honourable.
hor. Horizon.
Hos. Book of Hosea.
H.P. High pressure; high priest; high power; house physician; Houses of Parliament.
h.p. Half pay; hire purchase; horse power.
hr. Hour.
H.S. Home Secretary; hospital ship; house surgeon.
H.S.C. Higher School Certificate.
H.S.E. *Hic sepultus est* (Latin), here is buried.
H.T. Hawaiian Territory; high tension.
Hunts. Huntingdonshire.
H.W. High water.
h.w. Hit wicket; hot water.

- H.W.M.** High water mark.
hy. Heavy.
hyd. Hydrostatic.
hyp. Hypothetical.
- I.** Island; one (Roman).
i. Intransitive.
ib., ibid. *Ibidem* (Latin), in the same place.
I.C. Indo-China; internal combustion.
i/c. In charge of.
I.C.I. Imperial Chemical Industries.
I.C.S. Indian Civil Service; International Correspondence Schools.
id. *Idem* (Latin), the same.
Ida. Idaho.
I.D.B. Illicit diamond buyer.
I.D.G. Imperial Defence College.
I.E. Indo-European.
i.e. *Id est* (Latin), that is.
I.G. *Industrien Gesellschaft* (a German chemical combine); Inspector General.
I.H.S. *Iesus Hominum Salvator* (Latin), Jesus, the Saviour of mankind.
- Ill.** Illinois.
illus. Illustrated by; illustration(-s).
I.L.O. International Labour Office.
i.l.o. In lieu of.
I.L.P. Independent Labour Party.
Imp. *Imperator* (Latin), emperor; Imperial.
imp. Imperative; imperfect (grammar); import(-s)(-ed); impression (publishing); *imprimatur* (Latin), let it be printed.
in. Inch.
Inc. Incorporated.
incl. Including; inclusive.
incog. *Incognito* (Italian), unknown.
Ind. Independent; index; Indian; Indiana; industrial.
I.N.D. *In nomine Dei* (Latin), in God's name.
ind. Indicative.
inf. Infinitive; information; *infra* (Latin), below, or further on.
infra dig. *Infra dignitatem* (Latin), beneath dignity.
I.N.I. *In nomine Iesus* (Latin), in the name of Jesus.
in loc. *In loco* (Latin), in its place.
inns. Innings.
in pr. *In principio* (Latin), in the first place.
I.N.R.I. *Iesus Nazarenus Rex Judaeorum* (Latin), Jesus of Nazareth, King of the Jews.
Ins. Inspector; insurance.
I.N.S. International News Service.
Insc. Inscribed.
Insp. Inspector.
inst. *Instante mense* (Latin), in the present month; institute(-d).
int. Interest; interim; interior; internal; interval.
int. al. *Inter alia* (Latin), among other things.
Inter. Intermediate examination.
intr. Intransitive.
Intro. Introduction.
introd. Introduced.
inv. Invented; invoice(-d).
Io. Iowa.
I.O. India Office; Intelligence officer.
I.O.M. Isle of Man.
I.O.W. Isle of Wight.
- I.P.A.** India pale ale.
I.Q. Intelligence quotient.
i.q. *idem quod* (Latin), the same as.
I.R.E. Inland Revenue.
I.R.A. Irish Republican Army.
I.R.C. International Red Cross.
I.R.O. Inland Revenue Office.
Is. Book of Isaiah; islands.
It. Italian (usually of vermouth).
Ital. Italian; italic.
I.W. Isle of Wight.
I.W.T. Inland water transport.
I.W.W. Industrial Workers of the World.
I.X. Jesus Christ.
- J.** Jack (cards); judge.
J.A. Judge-Advocate.
Jam. Epistle of S. James; Jamaica.
Jan. January.
J.C. Jesus Christ; Julius Caesar; *jurisconsultus* (Latin), lawyer; Justice-Clerk.
J.C.R. Junior common room.
J.D. Julian Day (calendar); Junior Dean.
Jer. Book of Jeremiah.
J.J. Justices.
Jn. Junction.
Jo'burg. Johannesburg.
loc. *Jocose* (-ly); *jocular* (-ly).
J.P. Justice of the Peace.
jr. Junior.
Jud. Book of Judith.
jud. Judicial.
Judg. Book of Judges.
Jun(-r). Junior.
- K.** Carat; kilogramme(-s); King.
Kans. Kansas.
K.B.(D). King's Bench (Division).
kc(s). Kilocycs.
kg. Kilogramme(-s).
kilo. Kilogramme; kilometre.
K.K.K. Ku-Klux-Klan.
kl. Kilolitre(-s).
K.L.M. *Koninklijke Luchtmacht Maatschappij* (Royal Dutch Air Lines).
K.M. King's Messenger.
km. Kilometre(-s).
k.o. Knock-out.
kn. Kneen.
Kt. Knight.
Ky. Kentucky.
- L.** Fifty (Roman); Lake; Latin; learner (motoring); left; Liberal; lira or lire.
£ *Libra* (Latin), pound(-s) (money).
l. Large; length; line; link(-s) (measure); litre(-s).
La. Louisiana.
L.A. Law agent; local authority.
£A. Australian pound(-s).
la. Last(-s) (weight).
Lab. Labour; Labrador.
lab. Laboratory.
Lam. Lamentations of Jeremiah.
Lancs. Lancashire.
Lat. Latin.
lat. Latitude; latrine.
lb. *Libra* (Latin), pound(-s) (weight).
l.b. Leg-bye(-s).
l.b.w. Left before wicket.
L.C. Left of centre (stage); level crossing.
l.c. Letter of credit; *locus citatus* (Latin), the passage mentioned; lower case (type).
l/c. Letter of credit.
- L.C.M.** Least common multiple.
L.D. *Laus Deo* (Latin), praise be to God; Low Dutch.
L.E. Labour exchange.
£E. Egyptian pound(-s).
Leg. Legation.
leg. Legal; *legato* (Italian), smoothly.
Leics. Leicestershire.
Lev(it). Book of Leviticus.
L.G. Lloyd-George (1st Earl); Low German; The London Gazette.
L.Gr. Low Greek.
L.H. Left hand.
Lib. Liberal; librarian; library.
Lincs. Lincolnshire.
liq. Liquid.
Lit. Literature; Little.
lit. Literal(-ly); litre.
Lit.Hum. *Litterae Humaniores* (Latin), Oxford examination in classics.
LL. Laws.
L.L. Late, or low, Latin; Lend-Lease.
ll. Lines.
L.M. Long measure (music).
L.M.S.(R.). London, Midland, and Scottish Railway.
L.N.E.R. London and North-Eastern Railway.
loc. cit. *Loco citato* (Latin), at the place mentioned.
log(-s). Logarithm(-s).
Lon. London.
long. Longitude.
loq. *Loquitor* (Latin), he speaks.
L.P. Long primer; low pressure.
L.P.O. London Philharmonic Orchestra.
L.P.T.B. London Passenger Transport Board.
lr. Lower.
L.S. *Locus sigilli* (Latin), the place of the seal.
L.S.C. Lower School Certificate.
L.s.d. *Librae, solidi, denarii* (Latin), pounds, shillings, and pence.
L.S.E. London School of Economics.
L.S.O. London Symphony Orchestra.
L.S.T. Local standard time.
L.T. Line telegraphy; London Transport; low tension.
£T Turkish pound(-s).
lt. Light (adjective).
Ltd. Limited.
L.U.E. Left upper entrance.
Luth. Lutheran.
L.V. Last vehicle; Licensed Victuallers.
L.W. Long wave.
L.W.L. Load water line.
L.W.M. Low water mark.
LXX. The Septuagint.
- M.** Male; Martyr; Master; mate; men; Methodist; *Monsieur* (French), Mr.; one thousand (Roman).
m. Maiden(-s) (cricket); married; masculine; metre(-s); mile(-s); mill; minim; minor; minute(-s); month(-s); mother.
ma. Major (elder).
m/a. My account.
Macc. Book of Maccabees.
mach. Machinery.
mag. Magazine; magnetic; magneto; magnitude; magnum.
Mal. Book of Malachi.
Man. Manitoba.
man. Manual; manufacture(-d).
- M & B 693.** May and Baker sulphonamide.
Mar. March.
mar. Married; maritime.
mar. Marginal.
Mat. Gospel of S. Matthew; matinee; Matins.
max. Maximal; maximum.
M.C. Master of ceremonies.
M(C)r. Manchester.
Md. Maryland.
M.D. Mentally deficient; Middle Dutch.
m.d. Month's date.
Me. Maine.
M.E. Marine engineer; Middle East; Middle English.
mech. Mechanical.
Med. Medical; medieval; Mediterranean; medium.
mem. Memento; memorandum; memorial.
Mer. Merionethshire.
mer. Meridian.
Mess. Messenger.
Messrs. *Messieurs* (French), Sirs.
Met. Metallurgical; metaphysical; meteorology; metronome; metropolitan; Metropolitan Railway.
Meth. Methodist.
meth. Methylated spirit.
mf. *Mezzo forte* (Italian), moderately loud.
mf. More follows.
mfd. Manufactured.
mfg. Manufacturing.
M.F.H. Master of Foxhounds.
M.F.N. Most favoured nation.
M.F.R. Middle French.
mfr. Manufacturer.
mg. Milligramme(-s).
M.G.M. Metro-Goldwyn-Mayer.
M.H.G. Middle High German.
M.I. Medical inspection; Military intelligence.
mi. Minor (younger).
Mic. Book of Micah.
Mich. Michigan.
midx. Middlesex.
mil. Military; milreis.
Min. Minister; Ministry; minister.
min. Mineral; minim; minimum; minimus (youngest); minute.
Minn. Minnesota.
Miss. Mississippi.
M.It. Middle Italian.
mkt. Market.
M.L. Medieval Latin.
ml. Millilitre(-s).
M.L.G. Middle Low German.
mlle., mdle. *Mademoiselle* (French), Miss.
MM. Martyrs; *Messieurs* (French), Sirs.
M.M. Maelzel's metronome; *Messageries Maritimes* (French shipping company).
mm. Millimetre(-s).
m.m. *Mutatis mutandis* (Latin), the necessary changes being made.
Mme. Madame.
M.N. Merchant Navy.
Mo. Missouri.
M.O. Manually operated; Medical Officer; money order.
mo. Month.
mod. Moderate; modern.
Mods. Moderations.
M.O.H. Master of Otterhounds; Medical Officer of Health; Ministry of Health.
M.O.I. Ministry of Information.
Mon. Monastery; Monday; Monmouthshire.
mon. Monetary.

- Mons.** *Monsieur* (French); Mr. (incorrect abbrev.).
- Mont.** Montana; Montgomeryshire.
- M.O.O.** Money order office.
- Mort.** Mortgage.
- M.P.** Member of Parliament; Metropolitan Police; Military Police.
- mp.** *Mezzo piano* (Italian), moderately soft.
- M. Pen.** Ministry of Pensions.
- m.p.g.** Miles per gallon.
- m.p.h.** Miles per hour.
- M.P.O.** Metropolitan Police office.
- Mr.** Mister.
- M.R.** Map reference; *Maria Regina* (Latin), Queen Mary; Municipal Reform.
- Mrs.** Mistress (married woman).
- MS(-S).** Manuscript(-s).
- M.S.** Motor ship.
- M.S.H.** Master of Stag-hounds.
- M.S.L.** Mean sea level.
- M.T.** Means test; mechanical transport; Ministry of Transport.
- mt(-s).** Mount or mountain(-s).
- mtd.** Mounted.
- mun., munic.** Municipal.
- mus.** Museum; musical.
- M.V.** Merchant vessel; motor vessel.
- M.Y.** Motor yacht.
- N.** Nationalist; Norse; North.
- n.** Name; *natus* (Latin), born; nephew or niece; neuter; noun.
- n/a** No account; no advice.
- Nah.** Book of Nahum.
- Nat.** Natal (Province); national; Nationalist; natural.
- N.B.** New Brunswick; North Britain (Scotland) (obsolete term); *nota bene* (Latin), note well.
- n.b.** No ball(-s) (cricket).
- N.C.** North Carolina.
- n.d.** No date.
- N.D(ak).** North Dakota.
- N.D.C.** National Defence Contribution.
- N.D.L.** *Norddeutscher Lloyd* (German shipping company).
- N.E.** New edition; New England; no effects; North-East.
- Neb.** Nebraska.
- N.E.D.** New English Dictionary.
- neg.** Negative(-ly).
- Neh.** Book of Nehemiah.
- N.E.I.** Netherlands East Indies.
- n.e.i.** *Non est inventus* (Latin), it has not been found; not elsewhere indicated.
- nem. con.** *Nemine contradicente* (Latin), nobody opposing.
- nem. dis.** *Nemine dissentiente* (Latin), nobody dissenting.
- Nev.** Nevada.
- N.F.** Newfoundland; Norman French.
- N.G.** New Guinea; no good.
- N.Gr.** New Greek.
- N.H.** New Hampshire.
- N.H.I.** National health insurance.
- N.H.R.** National Hunt rules.
- N.I.** Northern Ireland.
- ni. pri.** *Nisi prius* (Latin), unless formerly.
- N.I.R.A.** National Industrial Recovery Act.
- N.J.** New Jersey.
- N.M.** Nautical mile(-s); New Mexico.
- N.N.E.** North-North-East.
- N.N.W.** North-North-West.
- N.O.** Natural order (botany), no(-s). *Numéro(-s)* (French), number(-s).
- n.o.** Not out (cricket).
- nom.** Nominak(-ly); nominative.
- non.** Nonagon(-al).
- non obt.** *Non obstante* (Latin), notwithstanding.
- non pros.** *Non prosequitur* (Latin), he does not prosecute.
- non seq.** *Non sequitur* (Latin), it does not follow.
- Norf.** Norfolk.
- Northants.** Northamptonshire.
- Norvic** *Norwicensis* (Latin), of Norwich (Bp.'s signature).
- Notts.** Nottinghamshire.
- Nov.** November.
- N.P.** National Provincial Bank; notary public.
- n.p.** Net personality; new paragraph; no place of publication given.
- N.P.F.** Newspaper Press Fund.
- n.p. or d.** No place or date.
- N.P.L.** National Physical Laboratory.
- n.p.v.** No par value.
- N.R.** North Riding.
- nr.** Near.
- N.R.A.** National Recovery Administration.
- N.S.** New style (chronology); not on Saturdays; Nova Scotia.
- n.s.** Not specified.
- N.S.W.** New South Wales.
- N.T.** New Testament; new translation; North Territory (Australia); no trumps.
- n.u.** Name unknown.
- Num.** Numb. Book of Numbers.
- N.V.** New version; *Novissima verba* (Latin), latest information.
- N.W.** North-West.
- N.W.F.P.** North-West Frontier Province.
- N.W.I.** Netherlands West Indies.
- N.W.M.P.** North-West Mounted Police.
- N.W.P.** North-West Provinces.
- N.W.T.** North-West Territories.
- N.Y.** New York (State).
- N.Y.C.** New York City.
- n.y.d.** Not yet diagnosed.
- N.Y.K.** *Nippon Yusen Kaisha* (Japan Mail Steamship Company).
- n.y.p.** Not yet published.
- N.Z.** New Zealand.
- O.** Ohio.
- o.** Offered (betting); only; overs (cricket).
- O.A.** Official assignee.
- o/a** On account.
- O.A.P.** Old age pension.
- Ob.** Oboe.
- O.B.** Outside broadcast.
- ob. Obiit** (Latin), he died.
- Obad.** Book of Obadiah.
- obb.** Obligato.
- obj.** Object(-ive).
- O.B.M.** Ordnance Bench Mark.
- obz.** Obsolete.
- obv.** Obverse.
- o.c.** *Opere citato* (Latin), in the work mentioned.
- o/c** Overcharge.
- Oct.** October.
- oct.** Octagon(-al); octavo.
- O.D.** Old Dutch; outside diameter.
- O/D** On demand; overdraft.
- O.E.** Old English; omissions excepted.
- O.E.E.C.** Organization for European Economic Co-operation.
- O.E.D.** Oxford English Dictionary.
- O.F.** Old French.
- O.F.S.** Orange Free State.
- Ogpn.** *Obedinnennoye Gosudarstvennoye Politicheskoye Upravleniye* (Russian), Unified State Political Department (secret police).
- O.H.G.** Old High German.
- O.H.M.S.** On His Majesty's Service.
- O.Ir.** Old Irish.
- Okla.** Oklahoma.
- O.L.** Old Latin.
- O.L.G.** Old Low German.
- o.m.** Old measurement.
- O.N.** Old Norse.
- O.N.F.** Old Norman French.
- Ont.** Ontario.
- Op(-s).** Operation(-s).
- O.P.** Old prices; opposite prompter; out of print.
- op.** *Opus* (Latin), published work.
- o.p.** Over proof.
- op. cit.** *Opere citato* (Latin), in the work mentioned.
- o.p.n.** *Ora pro nobis* (Latin), pray for us.
- opp.** Opposed; opposite.
- opt.** Optician; optional.
- Or.** Oriental.
- O.R.** Official receiver.
- or(-s).** Other(-s).
- Ord.** Ordinance; Ordnance.
- ord.** Ordained; order(-ed); ordinal; ordinary.
- Ore.** Oregon.
- Org.** Organ; organic.
- o.r.r.** Owner's risk rates.
- O.S.** Old Saxon; old series; old style (chronology); Ordnance Survey.
- o.s.** On spot; outside.
- o/s** Out of stock; outstanding.
- O.S.A.** Official Secrets Act.
- o.s.p., ob.s.p.** *Obiit sine prole* (Latin), died without issue.
- O.S.T.** Ordinary spring tides.
- O.T.** Old Testament; overtime.
- O.U.P.** Oxford University Press.
- Oxon.** Oxfordshire; *Oxonien-sis* (Latin), of Oxford (Bp.'s signature).
- oz.** Ounce(-s).
- P.** Car park; passed (examination); Police; Pope; Port.
- p.** Page; participle; past; *piano* (Italian), soft; pint; pole or perch.
- Pa.** Pennsylvania.
- P.A.** Personal assistant; power of attorney; Press Association; private account; provisional allowance; public address.
- p.a.** *Per annum* (Latin), yearly.
- P. & L.** Profit and loss.
- P. & O.** Peninsular and Oriental.
- par.** Paragraph; parallel; parish.
- para.** Paragraph.
- parl.** Parliamentary.
- pars.** Paragraphs; parentheses.
- Part.** Participating.
- part.** Participle; particular.
- Pat.** Patent.
- P.A.Y.E.** Pay as you earn.
- P.B.** British Pharmacopoeia; pawnbroker; Plymouth Brother, or Brethren; Prayer Book.
- P.C.** Perpetual curate; police constable; Privy Councillor.
- p.c.** Current prices; *per centum* (Latin), by the hundred; postcard.
- P.C.T.** Provincial Cinematograph Theatres.
- P.D.** Dublin Pharmacopoeia; position doubtful; postal district; potential difference; printer's devil.
- pd.** Paid.
- P.E.** Edinburgh Pharmacopoeia; personal estate; presiding elder.
- ped.** Pedal.
- P.E.I.** Prince Edward Island.
- Pemb.** Pembrokeshire.
- Pen.** Peninsula; penitentiary.
- Pent.** Pentateuch; Pentecost.
- pent.** Pentagon(-al); pentameter.
- per cent.** *Per centum* (Latin), by the hundred.
- perf.** Perfect; perform(-ance); perforated.
- Perp.** Perpendicular (architecture).
- per pro.** *Per procuracionem* (Latin), by proxy, on behalf of.
- Pers.** Persian.
- pes.** Peseta; peso.
- Pet.** Epistle of St. Peter.
- Petriburg.** *Petriburgensis* (Latin), of Peterborough (Bp.'s signature).
- Pf.** Preference shares.
- P.G.** German Pharmacopoeia; paying guest.
- Ph.** Philosophy.
- Phar.** Pharmaceutical; Pharmacopoeia.
- Phil.** Epistle to the Philippians; Philharmonic; Philippine; philology; philosophy.
- Philem.** Epistle to Philemon.
- phon.** Phonic(-ally).
- phr.** Phrase.
- pi.** Pice.
- pinx.** *Pinxit* (Latin), he painted.
- pizz.** *Pizzicato* (Italian), plucked.
- Pk.** Park.
- pk.** Pack (weight); peck (measure).
- Pl.** Place (street).
- P.L.** London Pharmacopoeia; Poet Laureate.
- P/L.** Profit and Loss.
- pl.** Plate; plural.
- Plen.** Plenipotentiary.
- plff.** Plaintiff.
- P.L.M.** Paris-Lyon-Marseille Railway.
- plup.** Pluperfect.
- P.M.** Pacific mail; post master; Paymaster; peculiar measure (music); *piae memoriae* (Latin), of pious memory; prime minister.
- pm.** Premium.
- p.m.** *Post meridiem* (Latin), afternoon; *pro mense* (Latin), by the month.
- p.n.** Penitentiary note.
- P.O.** Postal order; post office; power operated.
- p.o.a.** Probation of Offenders Act.
- p.o.d.** Pay on delivery.
- P.O.P.** Printing-out paper.
- pop.** Popular(-ly); population.
- Port.** Portuguese.
- P.O.S.B.** Post Office Savings Bank.
- poss.** Possessive; possible.
- posth.** Posthumous(-ly).
- PP.** *Patres* (Latin), Fathers of the Church.
- P.P.** Parish priest; present pupil.

- pp. Pages; *pianissimo* (Italian), very soft.
- p.p. Past participle; *per procuratorem* (Latin), by proxy; post paid.
- p.p.c. Picture postcard.
- p.p.i. Policy as proof of interest.
- P.P.S. Parliamentary, or Principal, Private Secretary.
- P.Q. Parliamentary question; Province of Quebec.
- Pr. Prayer; Preferred stock; priest; primitive; printer; Provincial.
- P.R. *Populus Romanus* (Latin), the Roman people; Prize Ring; Proportional Representation; Public Relations; Puerto Rico.
- pr. Pair; pounder; present; pressure; price; pronoun.
- P.R.C. *Post Roman conditum* (Latin), after the founding of Rome.
- Preb. Prebendary.
- Pref. Preface; Preference shares; Preferred stock; prefix.
- Prelim. Preliminary examination.
- prem. Premium.
- prep. Preparation; preparatory; preposition.
- Pres. Presbyterian; President.
- Prim. Primary; Primate; Primitive.
- pro. Professional.
- Prob. Probate; problem.
- Proc. Proceedings; Proctor.
- Prof. Professor.
- Prom. Promenade (concert); promontory.
- pron. Pronoun; pronounce(-d).
- prop. Property; propriety; proposition; proprietary.
- Propr. Proprietor.
- Prot. Protestant.
- pro tem. *Pro tempore* (Latin), for the time being.
- Prov. Book of Proverbs; Provenance; Provost.
- prov. Province; provincial; provisional.
- prox. *Proximo mense* (Latin), in the next month.
- Ps(a). Psalm.
- P.S. Passenger steamer; Permanent Secretary; police sergeant; *postscriptum* (Latin), additional writing; Private Secretary; Privy Seal; prompt side.
- ps. Pesetas; pieces.
- P.S.A. Pleasant Sunday Afternoon.
- P.S.M.C. Pacific Steam Navigation Company.
- Pt. Point (geographical); Port.
- P.T. Physical training; postal town; pupil teacher.
- pt. Part; payment; pint; point; port.
- Ptg. Participating.
- ptg. Printing.
- P.T.I. Physical Training Instructor.
- P.T.O. Please turn over.
- pty. Party; proprietary.
- pub. Public; publication; published.
- publ. Publish(-er) or (-ed).
- P.U.S. Pharmacopoeia of the United States.
- P.X. Please exchange.
- pxt. *Pixit* (Latin), he painted.
- Q. Queen; query or question; the Quarto Shakespeare.
- q. Quart; quire.
- Q.A.B. Queen Anne's Bounty.
- Q.B. (D.). Queen's Bench (Division).
- q.e. *Quod est* (Latin), which is.
- q.e.d. *Quod erat demonstrandum* (Latin), which was to be shown.
- q.e.f. *Quod erat faciendum* (Latin), which was to be done.
- q.e.i. *Quod erat inventiendum* (Latin), which was to be found.
- q.l. *Quantum libet* (Latin), as much as is desired.
- Qld. Queensland.
- Q.M. Queen's Messenger.
- qr. Quarter; quire.
- Q.S. Quarter Sessions.
- q.s. *Quantum sufficit* (Latin), as much as suffices (a sufficient quantity).
- qt. Quantity; quart.
- qto. Quarto.
- qu. Query or question.
- quad. Quadrangle; quadrant; quadrilateral; quadruple.
- quant. suff. *Quantum sufficit* (Latin), as much as suffices (a sufficient quantity).
- Que. Quebec.
- quot. Quotation; quotient.
- q.v. *Quantum vis* (Latin), as much as you wish; *quod vide* (Latin), which see.
- qv. Query.
- R. Rabbi; Réaumur; response; restaurant car available; retard (clock); *Rex* or *Regina* (Latin), King or Queen; right; river; road; Roman; rupee.
- r. Radius; rare; residence; rises; rod(-s) (measure); road(-s); runs (cricket).
- R.A. Right ascension.
- Rad. Radical.
- rad. Radius.
- rall. *Rallentando* (Italian), becoming slower.
- R.C. Red Cross; Regional Commissioner; right of centre (stage); Roman Catholic.
- R.C.M.P. Royal Canadian Mounted Police.
- rept. Receipt.
- Rd. Road.
- R.D. Research department; Rural Dean.
- R/D. Return to drawer (banking).
- Rec. Record(-er); recreation ground.
- rec. Receipt; received; reception room; recipe.
- rect. Receipt; rectangle; rectified.
- Red. Redeemable.
- red. Reduced.
- ref. Referee; reference; referred; reformed; with reference to.
- refl. Reflexive.
- Reg. Regent; region(-al); registrar; regulation.
- reg. Register(-ed); regular(-ly).
- rel. Related; relative; religion.
- rem. Remarks.
- Ren. Renaissance.
- Rep. Repertory company; Representative; Republic(-an).
- rep. Repeat; repetition; *répétiteur* (orchestral); report(-er); represent(-ing); reprimand.
- repr. Representing; reprinted; reproduced.
- res. Reserve(-d); residence; resigned.
- resp. Respective(-ly); respondent.
- rest. Restored.
- ret(-d). Retire(-d); return (-ed).
- Rev. Revelation of S. John; Revenue; Reverend; Revolution (political).
- rev. Reverse(-d); revised; revolution (mechanical).
- R.F. Representative fraction; *République française* (French Republic).
- R.H. Right hand.
- Rho(d). Rhodesia.
- R.I. Rhode Island.
- R.I.C. Royal Irish Constabulary.
- R.I.P. *Requiescat in pace* (Latin), may he rest in peace.
- rit. *Ritardando, ritenente, ritenuto* (Italian), becoming slower.
- R.K.O. Radio-Keith-Orpheum.
- R.L.O. Railway Liaison officer.
- R.L.S. Robert Louis Stevenson.
- rly. Railway.
- Rm. Reichsmark(-s).
- R.M. Resident magistrate; Royal Mail.
- rm. Ream; room.
- R.M.O. Resident Medical Officer.
- R.M.S. Royal mail steamer.
- R.M.S.P. Royal Mail Steam Packet Company.
- R.O. Receiving officer; receiving order; recruiting officer; relieving officer; returning officer.
- ro. *Recto* (Latin), on the right-hand page; road; road.
- r.o. Run on (type); run out (cricket).
- Roffen *Roffensis* (Latin), of Rochester (Bp.'s signature).
- Rom. Epistle to the Romans; Roman.
- rom. Roman (type).
- R.P. Reply paid; reprint; rules of procedure.
- rr. Repeat; report.
- rt. *Rarissime* (Latin), very rarely; rear.
- Rs. Rupees.
- R.S.C. Rules of the Supreme Court.
- R.S.F.S.R. Russian Soviet Federated Socialist Republic.
- R.S.O. Railway sorting office; railway sub-office.
- R.S.V.P. *Répondez s'il vous plaît* (French), answer, if you please.
- Rt. Right.
- R.T. Radio telephony; received text.
- R.U.E. Right upper entrance.
- R.V. Rendezvous; Revised Version.
- R.X. Rix dollar; tens of rupees.
- R.Y.S. Royal Yacht Squadron.
- S. Saint; Saxon; Scotland; Socialist; South; spade (cards); statute; sun.
- s. Scalar; second(-s); sets (astronomy); section; shilling(-s); singular; son; soprano; succeeded.
- S.A. Sex appeal; small arms; *Société Anonyme* (French), limited company; South Africa; South America; *Sturm Abteilung* (German), Storm Division.
- Sask. Saskatchewan.
- Sat. Saturday.
- S.A.T.B. Soprano, alto, tenor, bass.
- Sax. Saxon(-y).
- sax. Saxophone.
- S.E. Savings bank; simultaneous broadcast; single-breasted; Swedenborgian.
- Sc. Scene; science; Scotland or Scots.
- S.C. Salvage Corps; same case (law); South Carolina; special constable; Staff College; Supreme Court.
- sc. *Scilicet* (Latin), to wit, or being understood; scruple(-s) (measure); *sculptist* (Latin), he made this sculpture, or he engraved.
- s.c. Small capitals.
- Scan(d). Scandinavia(-n).
- Sch. School; schooner.
- S.C.M. State certified midwife.
- scr. Scruple (measure).
- Sculp(s). *Sculpsit* (Latin), he made this sculpture, or he engraved.
- Sd. Signed; sound (geographical).
- S.D. Sequence-dating; sight draft.
- sd. Sewed (bookbinding).
- s.d. Semi-detached; several dates; *sine die* (Latin), without a day, indefinitely.
- S. (D)ak. South Dakota.
- S.D.I. Soft Drinks Industries.
- S.E. South-East; Stock Exchange.
- Sec. Secondary; secretary; section.
- sec. Secant; second.
- sect. Section.
- Sem. Seminary; Semitic.
- sem. Semi-colon.
- semp. *Sempre* (Italian), always, throughout.
- Sen. Senate; Senator; senior.
- sep. Separable; separate; *seppituli* (Latin), buried.
- Sept. September; Septuagint.
- seq. *Sequentia* (Latin), the following; *sequitur* (Latin), it follows.
- ser. Series.
- ser. Several.
- S.F. San Fein.
- siz. *Sforzando* (Italian), forcing.
- sg. Specific gravity.
- S.I. Sandwich Islands; Seine-Inferieure; staff inspector.
- Sig. *Signor* (Italian), Mr.
- sig. Signal; signature.
- Sigra. *Signora* (Italian), Mrs.
- sing. Singular.
- sit. Situation.
- Sjt. Serjeant.
- sk. Sack (weight).
- Skt. Sanskrit.
- Sl. Slavonic.
- S.L. Serjeant at Law; Solicitor at Law.
- Slov. Slovak; Slovene.
- s.l.p. *Sine legitima prole* (Latin), without lawful issue.
- S.M. Senior magistrate; short measure (music).
- S.M.T. Scottish Motor Traction (Company).
- s.n. *Sine nomine* (Latin), without name.
- So. South.
- S.O. Saturdays only; standing order; Stationery Office; sub-office.
- s.o. Seller's option.
- Soc. Socialist; Society.
- S. of S. Secretary of State; Song of Solomon.
- sol. Solicitor; solution.
- Som. Somersetshire.
- sop. Soprano.
- sov. Sovereign (£1).

- Sp. Spanish.
 S.P. Small paper; Songs of Praise; starting price.
 sp. Species; specimen; spelling; spirit.
 s.p. *Sine prole* (Latin), without issue; small pica.
 Span. Spanish.
 spec. Specially; species; speculation.
 sp. gr. Specific gravity.
 S.P.Q.R. *Senatus populusque Romanus* (Latin), the Senate and the Roman people; small profits, quick returns.
 Spt. Seaport.
 Sq. Square.
 sq. *Sequentia* (Latin), the following.
 Sr. Senior; *Señor* (Spanish), Mr.
 S.R. Southern Railway; special reserve.
 Sra. *Señora* (Spanish), Mrs.
 S.R.N. State registered nurse.
 SS. Saints; *Sanctissimus* (Latin), Most Holy.
 S.S. *Sacra Scriptura* (Latin), Holy Scriptures; *Schutz Staffel* (German), protective squadron; screw steamer; Secretary for Scotland; Secretary of State; Secret Service; steamship; Straits Settlements; Sunday School.
 ss. *Semissus* (Latin), one-half (medicine).
 S.S.E. South-South-East.
 S.S.R. Soviet Socialist Republic.
 S.S.W. South-South-West.
 St. Saint; strait; street.
 st. Stanza; stem; *set* (Latin), let it stand; stone; stumped (cricket).
 s.t. Short ton.
 Sta. *Santa* (Italian), female saint; *Señorita* (Spanish), Miss; station.
 Staffs. Staffordshire.
 Stat. Statute.
 stat. Stationary; statutory.
 Ste. *Sainte* (French), female saint.
 stg. Sterling.
 Stip. Stipendiary.
 str. Station.
 str. Seater (car); stroke (rowing).
 Strad. Stradivarius (violin).
 sub. Sub-editor; subject (-ive); subscription; substitute.
 subj. Subject(-ive); subjunctive.
 subst. Substantive; substitute(-d).
 suc(e). Succeeded.
 suf. Suffix.
 Suff. Suffolk; Suffragan.
 suff. *Sufficit* (Latin), it is enough; suffix.
 Sun. Sunday.
 Sup. Supply.
 sup. Superlative; supine (grammar); *supra* (Latin), above.
 Supp. Supplement.
 Supt. Superintendent.
 Sur. Surveyor.
 surg. Surgical.
 Surr. Surrogate.
 surv. Surveyor; surviving.
 Sus. The History of Susanna (Apocrypha).
 S.V. *Santa Virgo* (Latin), Holy Virgin.
 s.v. *Sub voce* (Latin), under the word or heading.
 svy. Survey.
 S.W. Short wave; South-West.
 Sx. Sussex.
 Sy. Surrey.
 S.Y. Steam yacht.
 sym. Symbol(-ic); symphony.
 syn. Synonym.
 syr. Syrup.
 T. Temperature.
 t. Taken (betting); tare; *tempore* (Latin), in the time of; tenor; transitive; ton(-s); town; tun.
 T.A. Telegraphic address.
 tan. Tangent.
 t. & o. Taken and offered.
 Tas. Tasmania.
 T.B. Tubercle bacillus; tuberculosis.
 T.D. Telegraph department; telephone department.
 t.e.g. Top edge gilt.
 Tel. Telegram; telegraph; telephone.
 temp. Temperature; temporary; *tempore* (Latin), in the time of.
 ten. Tenor; *tenuto* (Italian), sustained.
 Tenn. Tennessee.
 Terr. Terrace; Territory.
 Test. Testament; testator.
 Tex. Texas.
 t.f. Till forbidden.
 t.g. Type genus.
 Th. Theology; thermal; Thursday.
 T.H. Trust House.
 Thess. Epistle to the Thesalonians.
 Thur(s). Thursday.
 T.H.W.M. Trinity (House) high water mark.
 t.i.d. *Ter in die* (Latin), thrice daily.
 tinct. Tincture.
 Tit. Epistle to Titus.
 tit. Titular.
 T.L.W.M. Trinity (House) low water mark.
 T.M.O. Telegraph money order.
 Tn. Town; transportation.
 T.N. Telegraph number.
 T.O. Telegraph office; telephone office; turn over.
 Tob. Book of Tobit.
 Toe H. Talbot House.
 Tote. Totalisator.
 T.P. Teletypewriter; Thomas Power O'Connor.
 Tr. Treasurer; treble; trustee.
 tr., trans. Transaction; transitive; translate(-d); translation; transport; transpos(-d).
 trad. Traditional.
 Trans. Transitional (architecture). See also tr.
 Treas. Treasurer; Treasury.
 trib. Tributary.
 Trip. Tripos.
 Trom. Trombone.
 Trpt. Trumpet.
 Trs. Trustees.
 trs. Transfer; transpos(-e).
 Truron *Truronensis* (Latin), of Truro (Bp.'s signature).
 t.s. Till sale; typescript.
 T.S.F. *Télégraphie sans fil* (French), wireless.
 T.S.S. Twin-screw steamer.
 T.T. Teetotaler; Tourist Trophy; tuberculin-tested.
 Tu., Tues. Tuesday.
 T.U. Trade union.
 T.V.A. Tennessee Valley Authority.
 Tvl. Transvaal.
 T.Y.C. Two-year-old course.
 Tymp. Tympani.
 U. For universal exhibition (cinema); Unionist; Utah. u. Uncle.
 u.c. *Una corda* (Italian), on one string, in unison; upper case (type).
 U.D. United Dairies.
 U.D.C. Urban District Council.
 U.E. University Extension; upper entrance.
 U.I. Unemployment insurance.
 u.i. *Ut infra* (Latin), as below.
 U.K. United Kingdom of Great Britain and Northern Ireland.
 ult. *Ultimo mense* (Latin), in the last (previous) month.
 u.m. Under-mentioned; urgent memorandum.
 unan. Unanimous(-ly).
 unis. Unison.
 Unit. Unitarian.
 unnm. Unmarried.
 Up. Upper.
 U.P. United Presbyterian; United Provinces of Agra and Oudh.
 u.p. Under proof.
 U.S. Under-Secretary; United Services; United States.
 us. *Ut supra* (Latin), as above.
 u/s. Unserviceable.
 U.S.A. Union of South Africa; United States of America.
 U.S.M. United States Mail.
 U.S.S.R. Union of Soviet Socialist Republics.
 usu. Usually.
 u.s.w. *Und so weiter* (German), and so forth.
 u/t. Untrained.
 ut inf. *Ut infra* (Latin), as below.
 ut sup. *Ut supra* (Latin), as above.
 U.W. Underwriter; unladen weight.
 ux. *Uxor* (Latin), wife.
 V. Five (Roman); versicle; Vice; victory; volume.
 v. Valve; vector; verb; verse; *versus* (Latin), against; very; *vice* (Latin), in place of; *vide* (Latin), see.
 Va. Virginia.
 v.a. Active verb; *vixit annos* (Latin), he lived — years.
 vac. Vacation.
 val. Value(-d).
 van. Advantage (tennis).
 V. & M. Virgin and Martyr.
 Var. Variation; variety (theatre).
 var. Various(-ly).
 var. lect. *Varia lectio* (Latin), a different reading.
 vat. Vatican.
 vb(-l). Verb(-al).
 V.C. Vice-Chancellor; vice-chairman; vice-consul; (recipient of) Victoria Cross.
 V.D. Venereal disease.
 v.d. Various dates.
 V.D.H. Valvular disease of the heart.
 Ven. Venerable.
 verb. sap. *Verbum sapienti satis* (Latin), a word is sufficient for the wise.
 Vert. Vertebrata.
 vet. Veterinary (surgeon).
 v.f. Very fair.
 v.g. Very good.
 v.i. Intransitive verb; *vide infra* (Latin), see below.
 vil. Vilayet; village.
 V.I.P. Very important personage.
 viz. *Videlicet* (Latin), namely.
 Vla. Viola.
 Vlc. Violoncello.
 Vln. Violin.
 vo. *Verso* (Latin), on the left-hand page.
 vol. Voluntary; volume.
 V.R. *Victoria Regina* (Latin), Queen Victoria.
 V.S. Veterinary surgeon.
 vs. *Versus* (Latin), against.
 v.s. *Vide supra* (Latin), see above; *via satis* (Latin), scarcely sufficient; *volti subilo* (Italian), turn quickly.
 Vt. Vermont.
 Vulg. Vulgate.
 vulg. Vulgar(-ly).
 vv. Verses.
 v.v. *Vice versa* (Latin), the other way round.
 W. Wales; Wall's (ice cream); Warden; West; women.
 w. Water; week; wicket(-s); wide(-s) (cricket); wife; with.
 W.A. Western Australia.
 w.a.f. With all faults.
 W. & M. William and Mary.
 War. Warwickshire.
 Wash. Washington (State).
 W.B. Water Board; way bill.
 W.C. Water closet; West Central.
 w.c. Without charge.
 Wed. Wednesday.
 w.e.f. With effect from.
 Wes. Wesleyan.
 w.f. Wrong fount (type).
 W.G. William Gilbert Grace.
 wh. Which.
 whf. Wharf.
 W.I. West India; West Indies; wrought iron.
 Wilts. Wiltshire.
 Wind. I. Windward Islands.
 Winton *Wintonensis* (Latin), of Winchester (Bp.'s signature).
 Wis. Wisconsin.
 Wisd. The Wisdom of Solomon.
 Wit. Witwatersrand.
 wk. Week; work.
 wkt(-s). Wicket(-s).
 W.M. Worshipful Master.
 W.N.W. West-North-West.
 W.O. War Office.
 w.o. Walk-over.
 Wores. Worcestershire.
 W.P. Weather permitting.
 W.P.A. Works Progress Administration.
 w.p.a. With particular average.
 w.p.b. Waste paper basket.
 W.R. West Riding.
 W.R.I. War risks insurance.
 W.S.W. West-South-West.
 W.T. Wireless telegraphy; wireless telephony.
 wt. Weight; without.
 w.t. Watertight.
 W.W. Wood wind.
 Wyo. Wyoming.
 X. Christ (hence Xmas, Xn, Xty, etc.); Cross; ten (Roman).
 x.d. Not including right to dividend.
 x.i. Not including right to next interest.
 x.n. Not including right to new shares.
 XP. Express paid.
 xtry. Extraordinary.
 Y. Yen.
 y. Yard(-s); year(-s); youngest.
 Y.B. Year Book.
 yd(-s). Yard(-s).
 yday. Yesterday.
 Yorks. Yorkshire.
 yr. Year; younger; your.
 yrs. Years; yours.
 Z. Zero.
 Zech. Book of Zechariah.
 Zeph. Book of Zephaniah.
 zl. Zloty.

Section II. ASSOCIATIONS, INSTITUTIONS, TITLES, HONOURS, DEGREES

In this section, in order to save space and unnecessary repetition, those abbreviations which, when conjoined with other initials, stand for Member, Licentiate, Associate, Fellow, or President of an association or society are not usually listed under M., L., A., F., or P. Therefore, if an abbreviation is not found under any of those letters, look under the heading of the second letter in the abbreviation to find the name of the association or society, with the appropriate degrees of membership indicated in bold type. Also included here are various "root" abbreviations common to many localities (e.g. U.D.C. for Urban District Council), where the full abbreviation would normally include a preliminary initial, variable in accordance with the name of the locality. It should also be noted, in connexion with such "root" abbreviations as R.C. (Rowing Club) and D.S. (Dramatic Society), that a preliminary A. may signify Amateur: thus in the town of Z—, the abbreviation Z.A.D.S. would be recognized as signifying the Z— Amateur Dramatic Society. By combining two or more of the "root" abbreviations in this list, e.g. O.U. for Oxford University plus D.S. for Dramatic Society, the inquirer may easily work out for himself the significance of many more abbreviations than could possibly be printed here.

- A. Preceding other initials, may stand for Amateur, Assistant, or Associate.
- A.A. Architectural Association; Associate in Arts; Athletic Association; Automobile Association.
- A.B.A. Amateur Boxing Association.
- A.B.C. Australian Broadcasting Corporation.
- A.C. Advisory Committee; Appeal Court; Assistant Commissioner; Athletic Club.
- A.C.A. Associate of Institute of Chartered Accountants.
- A.C.P. Association of Correctors of the Press.
- A.C.S. American College of Surgeons (F.).
- A.D.A. Atomic Development Authority.
- A.E.L.T.C. All England Lawn Tennis Club.
- A.E.R.A. Associate Engraver, Royal Academy.
- A.E.U. Amalgamated Engineering Union.
- A.F.A. Amateur Football Association.
- A.F.C. Association Football Club.
- A.F.L. American Federation of Labor.
- A.G. Accountant General; Agent General; Attorney General.
- A.I. American Institute; Anthropological Institute; Auctioneers' and Estate Agents' Institute (A., F.).
- A.I.A. Association of International Accountants (A., F.).
- Ald. Alderman.
- A.L.P.A. Incorporated Society of Auctioneers and Landed Property Agents (A., F.).
- A.M. Albert Medal; Associate Member.
- A.M.A. Incorporated Association of Assistant Masters in Secondary Schools.
- A.M.C. Art Masters' Certificate.
- A.N.S. Academy of Natural Science.
- A.O.D. Ancient Order of Druids.
- A.O.F. Ancient Order of Foresters.
- A.O.H. Ancient Order of Hibernians.
- A.O.S. Ancient Order of Shepherds.
- A.P.S. Aborigines Protection Society; Association of Preparatory Schools.
- A.R.C. Automobile Racing Club.
- A.R.C.E. Academical Rank of Civil Engineer.
- A.S.A. Amateur Swimming Association.
- A.S.E. Amalgamated Society of Engineers.
- A.S.L.E. & F. Associated Society of Locomotive Engineers and Firemen.
- ASLIB. Association of Special Libraries and Information Bureaux.
- A.S.W. Association of Scientific Workers.
- B.A. Bachelor of Arts; British Academy (F.); British Association.
- Bac. *Baccalaureus* (Latin). Bachelor (degree).
- B.A.C.I.E. British Association for Commercial and Industrial Education.
- B.Agr. Bachelor of Agriculture.
- Ball. Balliol College.
- B. & F. B. S. British and Foreign Bible Society.
- B.Arch. Bachelor of Architecture.
- Bart. Baronet.
- B.B.B.C. British Boxing Board of Control.
- B.B.C. British Broadcasting Corporation.
- B.C. Boat Club; Borough Council; British Council.
- B.Ch. *Baccalaureus Chirurgiae* (Latin), Bachelor of Surgery.
- B.Ch.D. Bachelor of Dental Surgery (*Chirurgiae*, Latin).
- B.C.L. Bachelor of Civil Law.
- B.Com(m). Bachelor of Commerce.
- B.D. Bachelor of Divinity.
- B.D.A. British Dental Association.
- B.D.S. Bachelor of Dental Surgery.
- B.E. Bachelor of Engineering; (Order of the) British Empire (in titles).
- B.E.A. British Esperanto Association; British European Airways.
- B.Ed. Bachelor of Education.
- B.Eng. Bachelor of Engineering.
- B.E.S.A. British Engineering Standards Association.
- B. ès A. *Bachelier ès Arts* (French degree).
- B. ès L. *Bachelier ès Lettres* (French degree).
- B. ès S. *Bachelier ès Sciences* (French degree).
- B.E.U. British Empire Union.
- B.F.I. British Film Institute.
- B.I.A.E. British Institute of Adult Education.
- B.I.R. Board of Inland Revenue.
- B.I.S. Bank for International Settlements.
- B.L. Bachelor of Law; British Legion.
- B. Litt. Bachelor of Letters (*Litterarum*, Latin).
- B.L.L. Bachelor of Laws. (*Legum*, Latin).
- B.M. Bachelor of Medicine.
- B.M.A. British Medical Association.
- B.M.E. Bachelor of Mining Engineering.
- B.Med. Bachelor of Medicine.
- B.Mus. Bachelor of Music.
- Bn. Baron.
- B.N.C. Brasenose College.
- B.O.A. British Optical Association (F.).
- B.O.A.C. British Overseas Airways Corporation.
- B. of E. Bank of England; Board of Education.
- B.O.G. Bank Officers' Guild.
- B.O.T. Board of Trade.
- B.P.C. British Purchasing Commission.
- B.Ph(il). Bachelor of Philosophy.
- B.R.C.S. British Red Cross Society.
- Br. Omn. Rex. *Britanniarum Omnium Rex* (Latin), King of all the Britains.
- B.S.A. Bachelor of Scientific Agriculture; British School at Athens.
- B.S.A.A. British S. American Airways.
- B.Sc. Bachelor of Science.
- B.S.C. British Supply Council.
- B.S.I. Boot and Shoe Industry (A., F., M.); British Standards Institution.
- Bt. Baronet.
- B.Th. Bachelor of Theology.
- B.U.F. British Union of Fascists.
- B.W.I. British Workmen's Institute.
- B.W.T.A. British Women's Temperance Association.
- C.A. Chartered Accountant; Church Army; Church Association; County Alderman; Court of Appeal.
- C.A.C. Central Advisory Committee; County Agricultural Committee.
- C. and D. Chemist and Druggist.
- Cantab. *Cantabrigiensis* (Latin), member of Cambridge University.
- C.B. Companion of the Order of the Bath.
- C.B.C. Canadian Broadcasting Corporation.
- C.B.E. Commander of the Order of the British Empire.
- C.B.S. Church Building Society; Columbia Broadcasting System; Confraternity of the Blessed Sacrament.
- C.C. Caius College; Chamber of Commerce; Chief Clerk; Circuit Court; City Council; Civil Court; County Council(-lor); County Court; Cricket Club; Crown Clerk; Cycling Club.
- C.C.C. Central Criminal Court; Club Cricket Conference; Corpus Christi College; County Cricket Club.
- C.C.F. Co-operative Commonwealth Federation.
- C.C.J. County Court Judge.
- C.C.P. Court of Common Pleas.
- C.C.S. Corporation of Certified Secretaries (A., F.).
- C.D. Chancery Division; *Corps Diplomatique* (French), diplomatic body.
- C. de G. *Croix de Guerre* (French decoration).
- C.E. Chancellor of the Exchequer.
- C.E.A.P.E. Council for Education and Appreciation of Physical Environment.
- C.E.M.A. Council for the Encouragement of Music and the Arts.
- C.E.M.S. Church of England Men's Society.
- C.E.T.S. Church of England Temperance Society.
- C.E.Y.M.S. Church of England Young Men's Society.
- C.F. Corresponding Fellow.
- C.G. Commissary General; Consul General.
- C.G.I. City and Guilds of London Institute (A., F.).
- C.G.T. *Confédération (générale de Travail)* (French trade union body).
- C.H. Companion of Honour; Court House; Custom House.
- C.H.A. Co-operative Holidays Association.
- Ch.B. *Chirurgiae Baccalaureus* (Latin), Bachelor of Surgery.
- Ch.Ch. Christ Church, Oxford.
- Ch.d'A. *Chargé d'Affaires* (French), diplomat.
- Chev. *Chevalier* (French).
- Ch.M. *Chirurgiae Magister* (Latin), Master of Surgery.
- Chr.C. Christ's College.
- C.I. Imperial Order of the Crown of India; Institute of Commerce (A., F.).
- C.I.A. Corporation of Insurance Agents (A., F.).
- C.I.B. Corporation of Insurance Brokers (A., F.).
- C.I.D. Committee of Imperial Defence; Criminal Investigation Department.
- C.I.E. Companion of the Order of the Indian Empire.
- C.I.I. Chartered Insurance Institute (A., F.).
- C.I.O. Congress of Industrial Organizations.
- C.I.P.A. Chartered Institute of Patent Agents.
- C.I.S. Chartered Institute of Secretaries (A., F.).
- C.J. Chief Justice.

- C.L. Commander of the Order of Leopold.
 C.L.B. Church Lads' Brigade.
 C.M.B. Central Midwives Board.
 C.M.C.W. Calvinistic Methodist Church of Wales.
 C.M.D. Colonial Medical Department; *Chirurgiae Magister Dublinensis* (Latin), Master in Surgery, Dublin.
 C.M.G. Commander of the Order of S. Michael and S. George.
 C.M.S. Church Missionary Society; Colonial Missionary Society.
 C.O. Colonial Office; Criminal Office; Crown Office.
 C.O.B.S.R.A. Council of British Societies for Relief Abroad.
 C.P. Clerk of the Peace; College of Preceptors (A., F., L., M.); Common Pleas; Communist Party; Court of Probate.
 C.P.A. Institution of Certified Public Accountants (A., F.).
 C.P.C. Clerk of the Privy Council.
 C.P.R.E. Council for the Preservation of Rural England.
 C.P.S. *Custos Privati Stigilli* (Latin), Keeper of the Privy Seal.
 C.R. Community of the Resurrection; *Custos Rotulorum* (Latin), Keeper of the Rolls.
 C.R.A. Corporation of Registered Accountants (A., F.).
 C.R.O. Criminal Records Office.
 C.S. Chemical Society (F.); Clerk of Session; Clerk to the Signet; Common Sergeant; Court of Session; *Custos Stigilli* (Latin), Keeper of the Seal.
 C.S.C. Civil Service Commission.
 C.S.C.A. Civil Service Clerical Association.
 C.S.I. Chartered Surveyors' Institution; Companion of the Star of India.
 C.St. J. Companion of the Order of S. John of Jerusalem.
 C.T.C. Cyclists' Touring Club.
 C.U. Cambridge University.
 C.V.O. Commander of the Royal Victorian Order.
 C.W. Commissions and Warrants Department of the Admiralty; Common Wealth (Party).
 C.W.A. (Institute of) Cost and Works Accountants (A., F.).
 C.W.S. Co-operative Wholesale Society.
 D. Duke or Duchess.
 D.A. District Attorney.
 D.B.E. Dame Commander of the Order of the British Empire.
 D.C.L. Doctor of Civil Law.
 D.Cn.L. Doctor of Canon Law.
 D.C.S. Deputy-Clerk of Session.
 D.C.V.O. Dame Commander of the Royal Victorian Order.
 D.D. Doctor of Divinity.
 D.D.S. Doctor of Dental Surgery.
 D.Eng. Doctor of Engineering.
 D.F. Dean of Faculty; Defender of the Faith.
 D.F.H. Diploma of Faraday House.
 D.G.St. J. Dame of Grace of the Order of S. John of Jerusalem.
 D.I. District Inspector; Divisional Inspector.
 D.I.A. Design and Industries Association.
 Dip. Diploma.
 D.L. Deputy Lieutenant; Doctor of Law.
 D.Lit. Doctor of Literature.
 D.Litt. Doctor of Letters (*Litterarum*, Latin).
 D.Mus. Doctor of Music.
 D.O. Diploma of Ophthalmology; Doctor of Osteopathy; Dominions Office.
 D.E. Diploma in Economics.
 D.O.W.B. Director of Works and Buildings.
 Down. Downing College.
 D.Phil. Doctor of Philosophy.
 D.P.H. Department of Public Health; Diploma in Public Health.
 D.P.I. Director of Public Instruction.
 D.P.P. Director of Public Prosecutions.
 D.P.S. Director of Postal Services.
 Dr. Hy. Doctor of Hygiene.
 D.S. District Surveyor; Dramatic Society.
 D.Sc. Doctor of Science.
 D.S.I.R. Department of Scientific and Industrial Research.
 D.Th. Doctor of Theology.
 D.T.H. Diploma in Tropical Hygiene.
 D.T.M. Diploma in Tropical Medicine.
 D.V.M. Doctor of Veterinary Medicine.
 D.V.S. Doctor of Veterinary Science.
 D.Z. Doctor of Zoology.
 E.C. Education Committee.
 E.C.A. Early Closing Association.
 E.C.U. English Church Union.
 E.D.S. English Dialect Society.
 E.E. Envoy Extraordinary.
 E.I.C. East India Company.
 E.I.S. Educational Institute of Scotland (F.).
 E.M. Earl Marshal; Edward Medal; *Equitum Magister* (Latin), Master of the Horse.
 Emm. Emmanuel College.
 E.N.A. English Newspaper Association.
 E.S. Entomological Society (F.); Ethnological Society (F.).
 Esq. Esquire.
 E.S.U. English-Speaking Union.
 E.T.U. Electrical Trades Union.
 E.U. Evangelical Union.
 Exon. Exeter College.
 F. Preceding other initials, may stand for Fellow.
 F.A. Faculty of Actuaries (F.); Football Association.
 F.A.I. *Fédération Aéronautique Internationale*.
 F.A.O. Food and Agricultural Organization.
 F.A.S. Faculty of Architects and Surveyors (A., F.); Fellow of the Society of Arts.
 F.B.I. Federal Bureau of Investigation; Federation of British Industries.
 F.B.U. Fire Brigades Union.
 F.C. Football Club.
 F.C.A. Fellow of the Institute of Chartered Accountants.
 F.C.C. Federal Council of Churches; First Class Certificate; Food Control Committee.
 Fid. Def. *Fidei Defensor* (Latin), Defender of the Faith.
 F.O. Foreign Office.
 F.O.C. Father of Chapel (grade union).
 F.P.S. Faculty of Physicians and Surgeons (F., L.).
 F.R. Faculty of Radiologists (F.).
 F.S. Fabian Society; Friendly Society.
 F.S.I. Fellow of the Chartered Surveyors' Institution.
 F.S.L. First Sea Lord.
 F.S.S. Fellow of the Royal Statistical Society.
 G.A. General Assembly.
 G.B.E. Knight Grand Cross of the Order of the British Empire.
 G.C. George Cross; Golf Club.
 G.C.B. Knight Grand Cross of the Order of the Bath.
 G.C.C. Gonville and Caius College.
 G.C.H. Knight Grand Cross of Hanover.
 G.C.I.E. Knight Grand Cross of the Order of the Indian Empire.
 G.C.L.H. Knight Grand Cross of the Legion of Honour.
 G.C.M.G. Knight Grand Cross of the Order of S. Michael and S. George.
 G.C.S.I. Knight Grand Commander of the Star of India.
 G.C.St.J. Knight Grand Cross of the Order of S. John of Jerusalem.
 G.C.V.O. Knight Grand Cross of the Royal Victorian Order.
 G.F.S. Girls' Friendly Society.
 G.F.T.U. General Federation of Trade Unions.
 G.I. Institute of Certificated Grocers (A., F., M.).
 G.L.B. Girls' Life Brigade.
 G.M.B. Grand Master of the Order of the Bath.
 G.M.C. General Medical Council.
 G.M.I.E. Grand Master of the Order of the Indian Empire.
 G.M.K.P. Grand Master of the Knights of S. Patrick.
 G.M.M.G. Grand Master of the Order of S. Michael and S. George.
 G.M.S.I. Grand Master of the Order of the Star of India.
 G.O. Guild of Organists.
 G.P(h). Graduate in Pharmacy.
 G.P.D.S.T. Girls' Public Day School Trust.
 G.R.C.M. Graduate of the Royal College of Music.
 G.R.S.M. Graduate of the Royal School of Music.
 G.S. Geological Society (F.).
 G.S.M. Guildhall School of Music (A., F.).
 G.T. Good Templar.
 H.B.M. His Britannic Majesty.
 H.C. Herald's College; High Commissioner; Hockey Club.
 H.Com. High Commissioner.
 H.E. His Eminence; His Excellency.
 H.E.I.C. Honourable East India Company.
 H.F. Holiday Fellowship; Honorary Fellow.
 H.H. His Highness; His Holiness.
 H.I.H. His Imperial Highness.
 H.I.M. His Imperial Majesty.
 H.M. His (or Her) Majesty.
 H.M.C. Headmasters' Conference; His Majesty's Customs.
 H.M.I. His Majesty's Inspector.
 H.M.S.O. His Majesty's Stationery Office.
 H.O. Home Office.
 Hon. Honorary; Honourable.
 H.R.H. His (or Her) Royal Highness.
 H.W.C. Heriot-Watt College (A.).
 I.A. Incorporated Accountant; Institute of Actuaries (A., F.).
 I.A.A. Architect Member of the Incorporated Association of Architects and Surveyors (F.).
 I.A.C. Institute of Company Accountants (A., F.).
 I.A.E. Institute of Automobile Engineers (A., M.).
 I.A.H.M. Incorporated Association of Headmasters.
 I.A.L. Irish Academy of Letters.
 I.Arb. Institute of Arbitrators (A., F.).
 I.A.S. Surveyor Member of the Incorporated Association of Architects and Surveyors (F.).
 I.B. Institute of Bankers (F.).
 I.B.D. Institute of British Decorators (A.).
 (Inst.) B.E. Institute of British Engineers (A., M.).
 I.B.F. Institute of British Foundrymen (M.).
 I.C. Institute of Chemistry (A., F.).
 I.C.A. Institute of Chartered Accountants (F.); Irish Cyclists' Association.
 (Inst.) C.E. Institution of Civil Engineers (A., M.).
 I.Chem.E. Institution of Chemical Engineers (M.).
 I.C.S. Institute of Chartered Shipbrokers (A., F.); International Correspondence Schools.
 I.D. Institute of Directors (F.).
 I.D.C. Imperial Defence College.
 I.E. Order of the Indian Empire.
 (Inst.) E.E. Institution of Electrical Engineers (A., M.).
 I.F.T.U. International Federation of Trade Unions.
 I.G. Inspector General.
 I.Gas E. Institute of Gas Engineers (M.).
 I.G.C.M. Incorporated Guild of Church Musicians (F.).
 I.H. Institute of Hygiene (F.).
 I.H.V.E. Institute of Heating and Ventilating Engineers (F., M.).
 I.I. Imperial Institute (F.).
 I.I.A. Institute of Industrial Administration (A., F.).
 I.L. Institute of Linguists (A., F.).
 I.L.O. International Labour Office.
 I.Loco E. Institute of Locomotive Engineers (A., M.).
 I.L.P. Independent Labour Party.

- I.L.S. Incorporated Law Society.
 I.M.A. Indian Military Academy.
 Imp. *Imperator or Imperatrix* (Latin), Emperor or Empress.
 (Inst.) Mar.E. Institute of Marine Engineers (A., M.).
 I.M.D. Indian Medical Department.
 I.M.E. Institute of Mining Engineers (A., M.).
 (Inst.) Mech.E. Institution of Mechanical Engineers (A., M.).
 I.M.T. Institute of the Motor Trade.
 I.M.T.A. Institute of Municipal Treasurers and Accountants (A., F.).
 (Inst.) N.A. Institution of Naval Architects (A., M.).
 Inst. Act. Institute of Actuaries.
 Inst. F. Institute of Fuel (F.).
 Inst. M.M. Institute of Mining and Metallurgy (M.).
 Inst. P. Institute of Physics (A., F.).
 Inst. P.I. Institute of Patentees (A., F., M.).
 Inst. P.S. Institute of Private Secretaries (A., F., L.).
 Inst. T. Institute of Transport (M.).
 Inst. T.E. Institution of Transport Engineers (A., M.).
 I.O. India Office; Institute of Opticians (F.).
 I.O.B. Institute of Builders (A., F., M.).
 I.O.F. Independent Order of Foresters.
 I.O.G.T. International Order of Good Templars.
 I.O.J. Institute of Journalists.
 I.O.M. Indian Order of Merit.
 I.O.O.F. Independent Order of Oddfellows.
 I.O.R. Independent Order of Rechabites.
 I.P. Institute of Plumbers.
 I.P.S. Incorporated Photographic Society (F.).
 I.R.A. Irish Republican Army.
 I.R.C. International Red Cross.
 (Inst.) R.E. Institute of Radio Engineers (F.).
 I.S.A. Incorporated Secretaries' Association (A., F.).
 I.S.C. Imperial Service College.
 Iscor. Iron and Steel Corporation of South Africa.
 I.S.I. Iron and Steel Institute (M.).
 I.S.M. Imperial Service Medal; Incorporated Society of Musicians.
 I.S.O. Imperial Service Order.
 I.S.T.C. Iron and Steel Trades Confederation.
 I. Struct. E. Institute of Structural Engineers (F., M.).
 I.W. Inspector of Works.
 I.W.T. Institute of Wireless Technology (F., M.).
 I.Z. I Zingari Cricket Club.
 J.A. Judge-Advocate.
 J.C.D. *Juris Civilis Doctor* (Lat.), Doctor of Civil Law.
 J.D. Doctor of Jurisprudence; *Jurum Doctor* (Latin), Doctor of Laws.
 J.I. Institute of Journalists (F., M.).
 J.I.C. Joint Industrial Council.
 J.P. Justice of the Peace.
 J.P.B. Joint Production Board.
 J.S. Japan Society (M.).
 J.U.D. *Juris Utriusque Doctor* (Latin), Doctor of Civil and Canon Law.
 K. King.
 K.A. King-of-Arms; Knight of S. Andrew.
 K.A.N. Knight of S. Alexander Nevsky.
 K.B. King's Bench; Knight Bachelor; Knight of the Bath.
 K.B.D. King's Bench Division.
 K.B.E. Knight Commander of the Order of the British Empire.
 K.C. Kennel Club; King's College (A.); King's Counsel; Knight of Columbus.
 K.C.B. Knight Commander of the Order of the Bath.
 K.C.H. Knight Commander of Hanover.
 K.C.I.E. Knight Commander of the Order of the Indian Empire.
 K.C.L. King's College, London (F.).
 K.C.M.G. Knight Commander of the Order of S. Michael and S. George.
 K.C.S.G. Knight Commander of the Order of S. Gregory.
 K.C.S.I. Knight Commander of the Star of India.
 K.C.V.O. Knight Commander of the Royal Victorian Order.
 Keb. Kettle College.
 K.G. Knight of the Garter.
 K.G.C.B. Knight Grand Cross of the Order of the Bath.
 K.G.F. Knight of the Golden Fleece.
 K.G.St.J. Knight of Grace of the Order of S. John of Jerusalem.
 K.H. Knight of Hanover.
 K.H.C. Honorary Chaplain to the King.
 K.H.P. Honorary Physician to the King.
 K.H.S. Honorary Surgeon to the King; Knight of the Holy Sepulchre.
 K.I.H. Kaiser-i-Hind Medal.
 K.J.St.J. Knight of Justice of the Order of S. John of Jerusalem.
 K.L.H. Knight of the Legion of Honour.
 K.M. Knight of Malta.
 K. of C. Knight of Columbus.
 K.P. Knight of the Order of S. Patrick.
 K.P.M. King's Police Medal.
 K.R.C. Knight of the Red Cross.
 K.S. King's Scholar.
 K.S.G. Knight of S. Gregory.
 K.S.I. Knight of the Star of India.
 K.S.P. Knight of S. Patrick.
 K.St.J. Knight of the Order of S. John of Jerusalem.
 Kt. Knight.
 K.T. Knight of the Thistle; Knight Templar.
 L. *Preceding other initials, may stand for* Licentiate.
 L.A. Legislative Assembly (M.); Library Association (A., F.); Litterate in Arts; Local Authority; Member of Incorporated Society of Law Agents in Scotland.
 L.A.A. London Association of Accountants (A., F.).
 L.Adv. Lord Advocate.
 L.A.M. London Academy of Music.
 L.A.S. Land Agents' Society (F.); Lord Advocate of Scotland.
 L.A.U.K. Library Association of the United Kingdom.
 L.C. Lord Chamberlain; Lord Chancellor.
 L.C.B. Lord Chief Baron.
 L.Ch. Licentiate in Surgery (*Chirurgiae*, Latin).
 L.C.J. Lord Chief Justice.
 L.C.M. London City Mission; London College of Music (A., F., L.).
 L.d'H. *Légion d'Honneur* (French decoration).
 L.Div. Licentiate in Divinity.
 L.D.S. Licentiate in Dental Surgery.
 L.E.A. Local Education Authority.
 L.E.C. Local Employment Committee.
 Lès L. *Licencié ès Lettres* (French degree).
 L.G.A. Local Government Association (F.).
 L.G.B. Local Government Board.
 L.G.U. Ladies' Golf Union.
 L.H.A. Lord High Admiral.
 L.H.C. Lord High Chancellor.
 L.H.T. Lord High Treasurer.
 Lic. Licentiate.
 Linc. Lincoln College.
 Lit.D. Doctor of Literature.
 Litt.B. Bachelor of Letters (*Litterarum*, Latin).
 Litt.D. Doctor of Letters (*Litterarum*, Latin).
 L.J. Lord Justice.
 L.L. Lord-Lieutenant.
 L.L.A. Lady Litterate in Arts.
 LL.B. Bachelor of Laws.
 LL.D. Doctor of Laws.
 L.L.I. Lord-Lieutenant of Ireland.
 L.L.L. Licentiate in Laws.
 LL.M. Master of Laws.
 L.M. Licentiate in Medicine; Licentiate in Midwifery; Lord Mayor.
 L.M.H. Lady Margaret Hall.
 L.M.S. Licentiate in Medicine and Surgery; London Missionary Society.
 L.N.U. League of Nations Union.
 L.P. Labour Party; Lord Provost.
 L.P.C. Lord President of the Council.
 L.P.O. London Philharmonic Orchestra.
 L.P.S. Lord Privy Seal.
 L.P.T.B. London Passenger Transport Board.
 L.R.C. Labour Representation Committee; Leander Rowing Club; London Rowing Club.
 L.S. Linnean Society (A., F., M.).
 L.S.C. London Society of Composers (M.).
 L.S.E. London School of Economics.
 L.S.O. Labour Supply Organization; London Symphony Orchestra.
 L.T.A. Lawn Tennis Association; London Teachers' Association.
 L.T.C. Lawn Tennis Club.
 L.Th. Licentiate in Theology.
 M. *Preceding other initials, may stand for* Member.
 M.A. Master of Arts; Military Academy.
 M.A.A. Master at Arms.
 M.A.B. Metropolitan Asylums Board.
 Magd. Magdalen(-e) College.
 M.A.I. *Magister in Arte Ingeniaria* (Latin), Master of Engineering; Member of the Anthropological Institute.
 M.A.O. Master of Obstetric Art.
 March. Marchioness.
 Marg. Marquess.
 M.B. Bachelor of Medicine; Medical Board.
 M.B.E. Member of the Order of the British Empire.
 M.C. Member of Council.
 M.C.C. Marylebone Cricket Club.
 M.C.D. Doctor of Comparative Medicine; Member of the College of Dentists.
 M.Ch. *Magister Chirurgiae* (Latin), Master of Surgery.
 M.Ch.Orth. Master of Orthopaedic Surgery.
 M.C.L. Master of Civil Law.
 M.Com. Master of Commerce.
 M.Comm. Master of Commerce and Administration.
 M.D. Doctor of Medicine.
 M.D.S. Master of Dental Surgery.
 M.E. Most Excellent.
 M.E.C. Member of Executive Council.
 Med. Medallist.
 M.Eng. Master of Engineering.
 Mert. Merton College.
 M.Fed. Miners' Federation.
 Mgr. Monseigneur; Monsignor.
 M.Hon. Most Honourable.
 M.K.W. Military Knight of Windsor.
 M.L.A. Modern Language Association.
 M.M.S. Methodist Missionary Society.
 M.N. Merchant Navy.
 M.P. Member of Parliament; Minister Plenipotentiary.
 M.Ph.D. Master of Philosophy.
 M.R. Master of the Rolls.
 M.R.C. Medical Research Council.
 M.S. Master of Surgery; Musical Society.
 M.Sc. Master of Science.
 M.S.I. Member of the Chartered Surveyors' Institution.
 M.U. Mothers' Union; Motorists' Union; Musicians' Union.
 M.V.O. Member of the Royal Victorian Order.
 M.W. Most Worthy.
 M.W.B. Metropolitan Water Board.
 M.W.F.G.B. Mineworkers' Federation of Great Britain.
 N.A.L.G.O. National Association of Local Government Officers.
 N.A.S.U. National Adult Schools Union.
 N.B.A. North British Academy.
 N.B.C. National Broadcasting Company (U.S.A.).
 N.B.L. National Book League.
 N.B.S. National Broadcasting Service (New Zealand).
 N.C.C.L. National Council for Civil Liberties.
 N.C.C.V.D. National Council for Combating Venereal Diseases.
 N.C.L.C. National Council of Labour Colleges.
 N.C.S.S. National Council of Social Services.

- N.C.T.L. National Commercial Temperance League.
 N.C.U. National Cyclists' Union.
 N.F.B.T.O. National Federation of Building Trades Operatives.
 N.F.P.W. National Federation of Professional Workers.
 N.F.U. National Farmers' Union.
 N.F.W.I. National Federation of Women's Institutes.
 N.H.R.U. National Home Reading Union.
 N.J.A. National Jewellers' Association.
 N.L. Navy League.
 N.L.C. National Liberal Club.
 N.L.F. National Liberal Federation.
 N.P.A. Newspaper Proprietors' Association.
 N.P.L. National Physical Laboratory.
 N.R.A. National Rifle Association.
 N.S. National Society; Numismatic Society.
 N.S.A. National Skating Association.
 N.S.C. National Sporting Club.
 N.S.L. National Service League; National Sunday League.
 N(at).S.O.P.A. National Society of Operative Printers and Assistants.
 N.S.P.C.C. National Society for the Prevention of Cruelty to Children.
 N.S.S.U. National Sunday School Union.
 N.U. Northern Union (football).
 N.U.A.W. National Union of Agricultural Workers.
 N.U.B.S.O. National Union of Boot and Shoe Operatives.
 N.U.D.A.W. National Union of Distributive and Allied Workers.
 N.U.G.M.W. National Union of General and Municipal Workers.
 N.U.I. National University of Ireland.
 N.U.J. National Union of Journalists.
 N.U.R. National Union of Railwaymen.
 N.U.T. National Union of Teachers.
 N.U.T.G.W. National Union of Tailors and Garment Workers.
 N.U.T.N. National Union of Trained Nurses.
 N.U.W.T. National Union of Women Teachers.
 N.U.W.W. National Union of Women Workers.
 N.W.M.P. North-West Mounted Police.
 O.B.E. (Officer of the Order of the British Empire).
 O.D.F.L. Our Dumb Friends League.
 O.F. Oddfellow.
 O.F.M. Order of Friars Minor.
 O.L. Officer of the Order of Leopold.
 O.M. (Member of the) Order of Merit.
 O.P. Old Playgoers; Order of Preachers.
 O.R.C. Order of the Red Cross.
 O.S. Order of Servites.
 O.S.A. Order of S. Augustine.
 O.S.B. Order of S. Benedict.
 O.S.D. Order of S. Dominic; Ordnance Survey Department.
 O.S.F.(G.) Order of S. Francis (Capuchin).
 O.St.J. (Officer of the) Order of S. John of Jerusalem.
 O.T.D. Overseas Trade Department.
 O.U. Oxford University.
 O.W. Office of Works.
 Oxon. *Oxonienensis* (Latin), member of Oxford University.
 P. *preceding other initials, may stand for President or Principal; (alone) Prince.*
 P.A. Press Association; Publishers' Association.
 P.A.C. Pan-American Congress; Public Assistance Committee.
 P.A.T.A. Proprietary Articles Trade Association.
 P.B.T. President of the Board of Trade.
 P.C. Parish Council; Principal Chaplain; Privy Counsellor.
 P.C.M.O. Principal Colonial Medical Officer.
 P.D.A.D. Probate, Divorce, and Admiralty Division.
 P.D.S.A. People's Dispensary for Sick Animals.
 Pemb. Pembroke College.
 P.E.N. Poets, Playwrights, Essayists, Editors, and Novelists.
 P.E.P. Political and Economic Planning.
 Pet. Peterhouse, Cambridge.
 P.F. Procurator-Fiscal.
 P.G.A. Professional Golfers' Association.
 Ph.B. Bachelor of Philosophy.
 Ph.C. Pharmaceutical Chemist.
 Ph.D. Doctor of Philosophy.
 Ph.G. Graduate in Pharmacy.
 P.J. Presiding Judge; Probate Judge.
 P.K.T.F. Printing and Kindred Trades Federation.
 P.L.A. Port of London Authority.
 P.L.B. Poor Law Board.
 P.L.C. Poor Law Commission.
 P.M. Prime Minister.
 P.M.G. Postmaster-General.
 P.M.O. Principal Medical Officer.
 P.N.E.U. Parents' National Educational Union.
 P.P. *Pastor Pastorum* (Latin), the Pope; Past President.
 P.P.S. Parliamentary, or Principal, Private Secretary.
 P.R.A. President of the Royal Academy.
 Preb. Prebendary.
 P.R.E.A. People's Refreshment Houses Association.
 P.R.O. Public Records Office; Public Relations Officer.
 Prof. Professor.
 P.R.S. Proportional Representation Society.
 P.S. Pharmaceutical Society of Great Britain (M.).
 P.S.A. Private Schools Association.
 P.T.O. Public Trustee Office.
 P.U.S. Parliamentary Under-Secretary.
 P.V.O. Principal Veterinary Officer.
 P.W.D. Public Works Department.
 Q. Queen.
 Q.A.L.A.S. Qualified Association of the Land Agents' Society.
 Q.B.(D.) Queen's Bench (Division).
 Q.C. Queen's; or Queens' College; Queen's Counsel.
 Q.H.C. Queen's Honorary Chaplain.
 Q.H.P. Queen's Honorary Physician.
 Q.H.S. Queen's Honorary Surgeon.
 Q.U.B. Queen's University, Belfast.
 R. *Rez* or *Regina* (Latin), King or Queen.
 R.A. Refuges' Association; Road Association; Royal Academician; Royal Academy (A., P.).
 R.A.C. Royal Agricultural College (M.); Royal Automobile Club.
 R.A.C.S. Royal Arsenal Co-operative Society.
 R.A.D. Royal Academy of Dancing (A.).
 R.A.D.A. Royal Academy of Dramatic Art.
 R.Ae.S. Royal Aeronautical Society (A., F., M.).
 R.A.G.C. Royal and Ancient Golf Club.
 R.A.I. Royal Anthropological Institute (F.).
 R.A.M. Royal Academy of Music (A., F., L.).
 R.A.O.B. Royal Antediluvian Order of Buffaloes.
 R.A.S. Royal Agricultural Society; Royal Asiatic Society (F., M.); Royal Astronomical Society (F.).
 R.B.A. Royal Society of British Artists (A.).
 R.B.S. Royal Botanic Society (F.); Royal Society of British Sculptors (A., F.).
 R.C.A. Railway Clerks' Association; Reformed Church of America; Royal Cambrian Academy (A.); Royal Canadian Academy (A.); Royal College of Art (A.).
 R.C.B. Rubber Control Board.
 R.C.I. Royal Colonial Institute (A., F.).
 R.C.J. Royal Courts of Justice.
 R.C.M. Royal College of Music (A., F., L.).
 R.C.N. Royal College of Nursing.
 R.C.O. Royal College of Organists (A., F., M.).
 R.C.O.G. Royal College of Obstetricians and Gynaecologists (F., M.).
 R.C.P.(E. or I.) Royal College of Physicians (Edinburgh or Ireland) (F., L., M.).
 R.C.S. Royal College of Science (A.).
 R.C.S. (E. or I.) Royal College of Surgeons (Edinburgh or Ireland) (F., L., M.).
 R.C.V.S. Royal College of Veterinary Surgeons (F., L., M.).
 R.D.C. Rural District Council.
 R.D.I. Royal Designer for Industry.
 R.D.S. Royal Drawing Society; Royal Dublin Society.
 R.E. Right Excellent; Royal Exchange; Royal Society of Painter-Etchers and Engravers (A.).
 R.Econ.S. Royal Economic Society (F.).
 Reg. Prof. Regius Professor.
 Res. Residential.
 R.E.S. Royal Empire Society (F., M.); Royal Entomological Society (F.).
 Rev. Reverend.
 R.F.C. Rugby Football Club.
 R.F.P.S. Royal Faculty of Physicians and Surgeons (F., L.).
 R.F.U. Rugby Football Union.
 R.G.S. Royal Geographical Society (F., M.).
 R.H. Royal Household (M.).
 R.H.A. Royal Hibernian Academy (A.).
 R.Hist.S. Royal Historical Society (F.).
 R.H.O. Regional Hospital Officer.
 R.Hort.S. Royal Horticultural Society (F.).
 R.H.S. Royal Humane Society.
 R.I. *Rez Imperator* or *Regina Imperatrix* (Latin), King-Emperor or Queen-Empress; Royal Institute of Painters in Water Colours; Royal Institution (F., M.).
 R.I.A. Royal Irish Academy (M.).
 R.I.B.A. Royal Institute of British Architects (A., F., L.).
 R.I.C. Royal Institute of Chemistry (A., F.).
 R.I.I.A. Royal Institute of International Affairs.
 R.I.P.H.H. Royal Institute of Public Health and Hygiene (F.).
 R.L. Rugby League.
 R.M.A. Royal Military Academy.
 R.M.C. Royal Military College.
 R.Met.S. Royal Meteorological Society (F.).
 R.M.I.(B. or G.) Royal Masonic Institution (for boys or girls).
 R.M.O. Royal Marine Officer.
 R.M.P.A. Royal Medical-Psychological Association.
 R.M.S. Royal Microscopical Society (F.); Royal Society of Miniature Painters (A.).
 R.N.C. Royal Naval College.
 R.N.L.I. Royal National Lifeboat Institution.
 R.N.S. Royal Numismatic Society (F.).
 R.N.S.A. Royal Naval School of Architects (F.).
 R.O. Royal Observatory.
 R.O.I. Royal Institute of Oil Painters.
 R.P. Regius Professor; Royal Society of Portrait Painters.
 R.P.A. Rationalist Press Association.
 R.P.E. Royal Society of Painter-Etchers and Engravers.
 R.P.S. Royal Photographic Society (A., F.).
 R.P.S.L. Royal Philatelic Society, London (F.).
 R.R.C. Lady of the Royal Red Cross.
 R.S. Royal Society (F., P.).
 R.S.A. Royal Scottish Academy; Royal Society of Antiquaries; Royal Society of Arts (A., F., M.).
 R.S.A.F. Royal Small Arms Factories.
 R.San.I. Royal Sanitary Institute (A., F., M.).

- R.S.C. Royal Society of Canada (F.).
 R.S.D. Royal Society of Dublin.
 R.S.E. Royal Society of Edinburgh (F.).
 R.S.G.S. Royal Scottish Geographical Society (F.).
 R.S.L. Royal Society, London: Royal Society of Literature (A., F., M.).
 R.S.M. Royal School of Medicine (F.): Royal School of Mines (A.).
 R.S.P.B. Royal Society for the Protection of Birds.
 R.S.P.C.A. Royal Society for the Prevention of Cruelty to Animals.
 R.S.P.P. Royal Society of Portrait Painters.
 R.S.S. *Regalis Societas Sodalitas* (Latin). Fellow of the Royal Society.
 R.S.S.A. Royal Scottish Society of Arts (F.).
 R.S.T. Royal Society of Teachers (F., M.).
 R.S.T.M.H. Royal School of Tropical Medicine and Hygiene (F.).
 R.S.W.S. Royal Scottish Water-Colour Society (A.).
 R.T.C. Royal Technical College, Glasgow (A.).
 R.T.S. Religious Tract Society; Royal Toxophilite Society.
 R.T.Y.C. Royal Thames Yacht Club.
 R.U. Rugby Union.
 R.U.I. Royal University of Ireland (F.).
 R.U.S.I. Royal United Service Institution (M.).
 R.U.S.Mus. Royal United Service Museum.
 R.V.C. Royal Victorian Chain.
 R.V.C.I. Royal Veterinary College of Ireland.
 R.V.I.A. Royal Victorian Institute of Architects (A., E.).
 R.W. Right Worshipful: Right Worshipy.
 R.W.A. Royal West of England Academy (A.).
 R.W.S. Royal Society of Painters in Water-Colours (A.).
 R.Y.S. Royal Yacht Squadron.
 S. *Preceding other initials, may stand for Sodalitas* (Latin), Fellow.
 S.A. Salvation Army: Society of Antiquaries (F.).
 S.A.A. Society of Incorporated Accountants and Auditors (A., F.).
 S.A.A.A. Scottish Amateur Athletic Association.
 S.A.C. Scottish Automobile Club.
 S.A.E. Society of Automobile Engineers.
 S.B.A.C. Society of British Aircraft Constructors.
 S.B.H. Scottish Board of Health.
 S.C. Salvage Corps, Supreme Court; Swimming Club.
 S.C.L. Student of Civil Law.
 S.C.M. Student Christian Movement.
 S.C.U. Scottish Cycling Union.
 S.D.F. Social Democratic Federation.
 S.E. Society of Engineers (F.).
 S.E.C. Stock Exchange Committee.
 S.E.D. Scottish Educational Department.
 Selw. Selwyn College.
 S.F.A. Scottish Football Association.
 S.G. Solicitor General.
 S.I. Star of India.
 S.J. Society of Jesus.
 S.J.A.A. S. John Ambulance Association.
 S.J.B.A. S. John Ambulance Brigade.
 S.M. Sons of Malta.
 S.M.P. Society of Miniature Painters.
 S.O. Scottish Office; Stationery Office.
 Som. Somerville College.
 S.P.C. Society for the Prevention of Crime.
 S.P.C.K. Society for the Promotion of Christian Knowledge.
 S.P.E. Society for Pure English.
 S.P.G. Society for the Propagation of the Gospel.
 S.P.R. Society for Psychical Research.
 S.P.R.C. Society for the Prevention and Relief of Cancer.
 S.P.R.L. Society for the Promotion of Religion and Learning.
 S.P.V.D. Society for the Prevention of Venereal Disease.
 S.R.U. Scottish Rugby Union.
 S.S. Secretary for Scotland; Secretary of State.
 S.S.C. Sculptural Society of Canada; Solicitor of the Supreme Court.
 S.S.J.E. Society of S. John Evangelist.
 S.S.M. Society of the Sacred Mission.
 S.T.B. Bachelor of Sacred Theology.
 S.T.D. Doctor of Sacred Theology.
 St. Edm. H. S. Edmund Hall.
 T.A. Typographical Association.
 T. & G.W.U. Transport and General Workers' Union.
 T.C. Town Clerk, Town Councillor; Trinity College; Touring Club.
 T.C.D. Trinity College, Dublin (F.).
 T.C.F. Touring Club of France.
 T.C.L. Trinity College, London (A., F., L.).
 T.G. Teachers' Guild.
 T.H. Transport House.
 T.I. Technical Institute: Textile Institute (A., F.).
 T.I.H. Their Imperial Highnesses.
 Toe H. Talbot House (Toe - T in Morse).
 T.P.I. Town Planning Institute (A., M.).
 T.R.C. Teachers' Registration Council; Thames Rowing Club.
 T.R.H. Their Royal Highnesses.
 Trin. Trinity College.
 T.U.C. Trades Union Congress, or Council.
 T.W.U. Transport Workers' Union.
 T.Y.C. Thames Yacht Club.
 U.A.B. Unemployment Assistance Board.
 U.A.P. United Australia Party.
 U.C.(L). University College, London.
 U.C.H. University College Hospital (London).
 U.C.P. United Country Party.
 U.D.C. Union of Democratic Control; Urban District Council.
 U.F.C. United Free Church.
 U.J.D. *Utriusque Juris Doctor* (Latin), Doctor of Civil and Canon Law.
 U.K.A. Ulster King-of-Arms; United Kingdom Alliance.
 U.N.A. United Nations Association.
 U.N.E.S.C.O. United Nations Educational, Scientific, and Cultural Organization.
 Univ. University (College).
 U.N.O. United Nations Organization.
 U.N.R.R.A. United Nations Relief and Rehabilitation Administration.
 U.P.C. United Presbyterian Church.
 U.S.I. United Service Institution.
 U.S. of S. Under-Secretary of State.
 U.S.S.C. United States Supreme Court.
 V.A. Order of Victoria and Albert; Vicar-Apostle.
 V. & A. Victoria and Albert Museum.
 V.C. Vice-Chancellor.
 V.D. Victorian Decoration.
 Ven. Venerable.
 V.H.S. Honorary Surgeon to the Viceroy of India.
 Vis(ct). Viscount.
 V.M.D. Doctor of Veterinary Medicine.
 V.M.H. Victoria Medal of Honour.
 V.P. Vice-President
 Wadh. Wadham College.
 W.C.A. Women Citizens' Association.
 W.D. War Department; Works Department.
 W.E.A. Workers' Educational Association.
 W.I. Women's Institute.
 W.L.F. Women's Liberal Federation.
 W.O. War Office.
 Wp. Worship (title).
 W.R.U. Welsh Rugby Union.
 W.S. Writer to the Signet.
 W.T.A. Workers' Travel Association.
 W.U.S.L. Women's United Service League.
 Y.C. Yacht Club.
 Y.H.A. Youth Hostels Association.
 Y.M.C.A. Young Men's Christian Association.
 Y.M.C.U. Young Men's Christian Union.
 Y.M.F.S. Young Men's Friendly Society.
 Y.R.A. Yacht Racing Association.
 Y.W.C.A. Young Women's Christian Association.
 Y.W.S. Young Wales Society.
 Z.S. Zoological Society (F.).

Section III. WAR, THE SERVICES, CIVIL DEFENCE

The abbreviations that follow are those used by the Navy, Army, the Air Forces, and by the various Civil Defence and other associated Services in wartime. The list is necessarily selective though comprehensive. Decorations with both civilian and military classes are given in Section II.

- A. Acting; administration; assistant; Auxiliary Air Force; Naval Aviation.
 A.A. Anti-aircraft; Army Act.
 A.A.C. Army Air Corps.
 A.A.C.U. Anti-Aircraft Cooperation Unit.
 A.A.D.C. Anti-Aircraft Defence Commander.
 A.A.F. Auxiliary Air Force.
 A.A.G. Assistant Adjutant-General.
 A.A.L.M.G. Anti-aircraft light machine-gun.
 A. & A.E.E. Aircraft and Armament Experimental Establishment.
 A.A.Q.M.G. Assistant Adjutant and Quartermaster-General.
 A.A.S. Auxiliary Ambulance Service.
 A.A.S.C. Army Air Support Control.
 A.B. Able-bodied (seaman); Army Book.
 A.B.C. Air Booking Centre.
 A.B.C.A. Army Bureau of Current Affairs.
 A.B.C.D. America, Britain, China, Dutch East Indies.
 A.B.D.A. American-British-Dutch-Australian area.
 A.B.P.O. Army Base Post Office.
 A.B.T.S. Army Blood Transfusion Service.
 A.C. Aircraft carrier; aircraftman; armoured car, army cooperation.
 A/C. Aircraft.
 A.C.I. Aircraftman, 1st Class.
 A.C.2. Aircraftman, 2nd Class.
 A.C.C. Army Catering Corps.
 A.Cdre. Air Commodore.
 A.Cdt. Air Commandant (W.R.A.F.).
 A.C.F. Army Cadet Force.
 A.C/H. Aircraft-hand.
 A.C.I. Air Council Instruction; Army Council Instruction.
 Ack. Acknowledged.
 A.C.M. Air Chief Marshal.
 A.C.S.E.A. Air Command, South-East Asia.
 A.C.V. Armoured command vehicle.
 A.C.W. Aircraftwoman.
 A.C.W.1. Aircraftwoman, 1st Class.
 A.C.W.2. Aircraftwoman, 2nd Class.
 A.D. Air dispatch; armoured division; assistant director.
 A.D.C. Aide - de - camp; Army Dental Corps.
 A.D.D.L. Airfield Dummy-Deck Landing.
 A.D.G.B. Air Defence of Great Britain.
 Adj. Adjutant.
 Adm. Administration; Adm-ality.
 A.D.M.S. Assistant Director of Medical Services.
 A.D.O.S. Assistant Director of Ordnance Services.

- A.D.R.U.** Air Despatch and Reception Unit.
A.D.S. Advanced dressing station.
Adv. Advance(d).
A.E.A. Air Efficiency Award.
A.E.C. Army Educational Corps.
A.E.F. Allied Expeditionary Force.
A.E.M. Air Efficiency Medal.
A.E.O. Air Engineer Officer.
A.F. Admiral of the Fleet; Allied Forces; Army Form.
A/F. Airfield.
A.F.C. Air Force Cross.
A.F.M. Air Force Medal.
A.F.P.U. Army Film and Photographic Unit.
A.F.S. Air Formation Signals; American Field Service; Army Fire Service; Auxiliary Fire Service.
A.F.V. Armoured fighting vehicle.
A.G. Adjutant-General; air gunner; anti-gas.
A.G.R.A. Army Group, Royal Artillery.
A.H.Q. Air Headquarters.
A.I. Aircraft interception (radar).
A.I.D. Aeronautical Inspection Directorate.
A.I.F. Australian Imperial Forces.
A.I.L.O. Air Intelligence Liaison Officer.
A.K.S. Army Kinematography Service.
A.L.F. Allied Land Forces.
A.L.F.E.A. Allied Land Forces, South-East Asia.
A.L.G. Advanced landing ground.
A.L.O. Air Liaison Officer.
A.L.S. Air Letter Service.
A.M. Air Marshal; Air Member; Air Ministry.
A.M.C. Aircraft Message Control; Armed Merchant Cruiser.
A.M.E.S. Air Ministry Experimental Station.
A.M.F. Australian Military Forces.
A.M.G.(O.T.). Allied Military Government (of Occupied Territories).
Amn. Ammunition.
A.M.O. Air Ministry Order.
A.M.P. Air Member for Personnel.
A.M.T. Air Member for Training.
A.N.S. Auxiliary Nursing Service.
Anzac. Australian and New Zealand Army Corps.
A.O. Army Order.
A.O.A. Air Officer Administration.
A.O.C.(in-C). Air Officer Commanding (in-Chief).
A.O.P. Air Observation Post.
A.O.S. Angle of sight.
A.P. Aiming point; air publication; ammunition point; armour-piercing.
A.P.I.S. Army Photographic Interpretation Section.
A.P.M. Assistant Provost Marshal.
App.Air. Aircraft Apprentice.
A.P.O. Army Post Office.
A.P.S. Army Postal Services.
A.P.T.C. Army Physical Training Corps.
A.Q.M.G. Assistant Quartermaster-General.
A/R. Aircraft Recognition.
A.R.H. Ammunition rail-head.
A.R.O. Army Routine Order.
A.R.P. Air Raid Precautions; ammunition refilling point.
A.R.R.C. Associate of the Royal Red Cross.
Arty. Artillery.
A.R.W. Air raid warden or warning.
ASDIC. Admiralty Submarine Detection Investigation Committee.
A.S.G. Air Support Group.
A.S.H. Argyll and Sutherland Highlanders.
A.S.I. Air speed indicator.
A.S.L. Anti-submarine loops.
A.S.O. Air Staff Officer; Assistant Section Officer.
A.S.P. Air Stores Park.
A.S.R. Air-Sea Rescue.
A.S.S.U. Air Support Signals Unit.
A.S.V. Air to surface vessel (radar).
A.T. Animal Transport.
A/T. Anti-tank.
A.T.A. Air Transport Auxiliary.
A.T.C. Air Training Corps; Air Transport Command (U.S.).
A.T.D. Actual time of departure.
Attero. Atlantic Ferry Organization.
A.T.K. Anti-tank.
A.T.M. Army Training Memorandum.
A.T.S. Auxiliary Territorial Service.
Att. Attached.
A.V.M. Air Vice-Marshal.
A.V.R.E. Armoured vehicle, Royal Engineers.
A/W. All-weather.
A.W.O.L. Absent without official leave.
A.W.S. Army Welfare Services.
B. Balloon Branch; boat-swain; bomb-aimer; bombardment aircraft (U.S.); bomber.
B.A.B.S. Beam Approach Beacon System.
B.A.F.O. British Air Forces of Occupation.
B.A.F.S.E.A. Base Air Forces, South-East Asia.
B.A.O.R. British Army of the Rhine.
B.B. Balloon barrage.
B.B.C. Bromo-benzyl cyanide.
B.C. Battery Commander.
B.C.A.T.P. British Commonwealth Air Training Plan.
B.C.O.F. British Commonwealth Occupation Forces.
B.D. Battle dress; bomb disposal; boom defence.
Bde. Brigade.
Bir. Bombardier.
B.D.S. Bomb disposal squad.
B.D.V. Boom defence vessel.
B.E. Base ejection.
R.E.F. British Expeditionary Force.
B.E.M. British Empire Medal.
B.G.H. Base General Hospital.
B.G.S. Brigadier, General Staff.
B.H.Q. Battalion (or Battery or Battle) Headquarters.
B.L. Breech-loading.
B/L. Bomb-line.
B.L.A. British Liberation Army.
B.M. Beachmaster; Brigade Major.
B.M.H. British Military Hospital.
Bn. Battalion.
B.O.R. British other rank.
Bos'n. Boatswain.
B.O.W.O. Brigade Ordnance Warrant Officer.
B.P.O. Base Post Office.
B.Q.M.S. Battery Quartermaster-Sergeant.
B.R. Book of reference.
B.R.A. Brigadier, Royal Artillery.
B.R.C.S. British Red Cross Society.
B.S.M. Battery Sergeant-Major.
Bt. Brevet.
B.T. British Troops.
B.T.O. Bombing through overcast (radar).
Bty. Battery.
B.W. Black Waten.
C. Captain (R.N.); cargo aircraft (U.S.).
C.A.A.T.O. Commander Army Air Transport Organization.
C.A.G. Civil Air Guard.
C & M. Care and maintenance.
C.A.P. Chloro-aceto-phenone.
Capt. Captain.
C.A.S. Chief of the Air Staff.
Cav. Cavalry.
C.B. Confidential book; confinement to barracks; counter-battery.
C.B.E. Central Bomber Establishment.
C.B.I. China-Burma-India.
C.B.O. Counter-Battery Officer.
C.C. Chief Controller (A.T.S.); Company Commander; Control Commission.
C.C.O. Chief of Combined Operations.
C.C.S. Casualty Clearing Station.
C.C.T.F. Combat Cargo Task Force.
C.D. Civil Defence; Coast Defence.
Cdo. Commando.
Cdr. Commander; Conductor.
C.D.R.C. Civil Defence Regional Commissioner.
C.D.R.S. Civil Defence Rescue Service.
C.D.S. Civil Defence Services.
Cd.S.O. Commissioned Supply Officer.
Cdt. Cadet.
C.D.V. Civil Defence Volunteers.
C.D.W.S. Civil Defence Warden's Service.
C.E. Chief Engineer.
C.F. Chaplain to the Forces.
C.F.I. Chief Flying Instructor.
Cfn. Craftsman.
C.F.S. Central Flying School.
C.G. Cargo glider (U.S.); coastguard; Coldstream Guards.
C.G.I. Chief Ground Instructor.
C.G.M. Conspicuous Gallantry Medal.
C.G.S. Canadian General Staff; Chief of the General Staff.
Ch.G. Chaplain General.
C.H.(L.) Chain home (low) (radar).
Ch. of F. Chaplain of the Fleet.
C.I. Chief Instructor.
C.I.G.S. Chief of the Imperial General Staff.
C-in-C. Commander-in-Chief.
C.K.S. Combined Kinematography Service.
C.M. Cruiser Minelayer.
C.M.B. Coastal motor-boat.
C.M.F. Central Mediterranean Force.
C.M.G. Congressional Medal for Gallantry (U.S.).
C.M.H. Combined Military Hospital.
C.M.P. Corps of Military Police.
C.N.O. Chief of Naval Operations.
C.N.P. Chief of Naval Personnel.
C.N.R. Civil Nursing Reserve.
C.N.S. Chief of Naval Staff.
C.O. Commanding Officer; Command Order(s); Conscientious objector.
C.O.D. Central Ordnance Dept.
C.O.I. Central Office of Information.
C.O.(L.) Chain overseas (low) (radar).
Col. Colonel; column.
Comd. Command (-er, -ing).
Comdt. Commandant.
C.O.M.E. Chief Ordnance Mechanical Engineer.
Comm. Commode.
Comm. Communication.
C.O.O. Chief Ordnance Officer.
C.O.P.P. Combined Operations Pilotage Party.
C.O.S. Chief of Staff.
Cov. Company.
C.P. Command post; common-pointed (shell); culminating point.
C.P.I.C. Combined Photographic Interpretation Centre.
Cpl. Corporal.
C.P.O. Chief Petty Officer; Command Post Officer.
C.Q.M.S. Company Quartermaster-Sergeant.
C.R.A. Commander, Royal Artillery.
C.R.E. Commander, Royal Engineers.
C.R.O. Command Routine Order; Corps Routine Order.
C.R.S. Camp Reception Station.
C.R.U. Civilian Resettlement unit.
C.S.C. Chief of Staff College; Conspicuous Service Cross (U.S.).
C.S.M. Company Sergeant-Major.
C.S.O. Chief Signals Officer.
C.S.S.B. Combined Services Signal Board.
C.T.C. Civil Technical Corps (U.S.A.); Combined or Corps Training Centre.
C.T.O. Chief Technical Officer.
C.T.T.B. Central Trade Test Board.
C.U.A.S. Cambridge University Air Squadron.
C.W. Chemical Warfare.
C.W.A.A.C. Canadian Women's Army Auxiliary Corps.
D. Dental Branch (R.A.F.); Deputy; destroyer.
D.A. Delayed action; deputy assistant; diphenyl-chlorarsine; direct action.
D.A.A.G. Deputy Assistant Adjutant-General.
D.A.D. Deputy Assistant Director.
D.A.F. Desert Air Force.
D.A.Q.M.G. Deputy Assistant Quartermaster-General.
D.A.S. Direct air support.
D.B.Ops. Director of Bomber Operations.
D.C. Depth-charge.

- D.C.L.I.** Duke of Cornwall's Light Infantry.
- D.C.M.** Distinguished Conduct Medal; District Court Martial.
- D.C.O.** Dental Clerk Orderly.
- D.C.T.** Depth-charge thrower.
- D.C.W.** Department of Chemical Warfare.
- D.D.** Deputy director; Duplex Drive.
- D.E.M.S.** Defensively equipped merchant ship.
- Det.** Detached; detachment; detonator.
- D.F.** Defensive fire; destroyer flotilla; direction finder (-ing).
- D.F.C.** Distinguished Flying Cross.
- D.F.M.** Distinguished Flying Medal.
- D.F.Ops.** Director of Fighter Operations.
- D.G.** Degaussing; Director-General; Dragoon Guards.
- D.G.D.** Director of Ground Defence (R.A.F.).
- D.G.M.S.** Director-General of Medical Services.
- D.G.O.** Director-General of Organization.
- D.G.P.** Director-General of Production.
- D.G.R.** Director(-General) of Graves Registration.
- D.G.R.D.** Director-General of Research and Development.
- D.G.S.** Director-General of Signals.
- D.G.Tn.** Director-General of Transportation Services.
- D.G.W.I.P.** Director-General of Weapons and Instruments Production.
- D.H.** Director of Hygiene.
- D.Hgs.** Director of Hirsings Service.
- D.I.** Daily Inspection.
- Div.** Division.
- D.I.W.T.** Director of Inland Water Transport Service (Army).
- D.Lab.** Director of Labour.
- D.L.C.O.** Deck Landing Control Officer.
- D.L.I.** Durham Light Infantry.
- D.M.** Diphenyl-amine-chloroarsine; Director of Mechanisation.
- D.M.C.** Director of Military Cooperation.
- D.M.I.** Director of Military Intelligence.
- D.M.O.** Director of the Meteorological Office (R.A.F.).
- D.M.O.I.** Director of Military Operations and Intelligence.
- D.M.Q.** Director of Movements and Quartering.
- D.M.S.** Director of Medical Services (Army).
- D.M.T.** Director of Military Training; driver, mechanical transport.
- D.N.A.** Director of Naval Account.
- D.N.A.D.** Director of Naval Air Division.
- D.N.E.** Director of Naval Equipment.
- D.N.F.T.U.** Day-Night Flying Training Unit.
- D.N.I.** Director of Naval Intelligence.
- D.N.M.S.** Director of Naval Medical Services.
- D.N.R.** Director of Naval Recruiting.
- Do.** Dormier.
- D.O.** Demi-official; Director of Organization; Divisional Order.
- D.O.D.** Director of Operations Division (R.N.).
- D.O.I.O.** Director of Intelligence Operations (R.A.F.).
- D.O.I.S.** Director of Intelligence, Security (R.A.F.).
- D.O.M.** Director of Manning.
- D.O.N.** Director of Navigation.
- D.O.S.** Director of Signals (R.A.F.).
- D.P.** Deep penetration; delivery point; dispersal point; displaced person; drill purposes; Duty Pilot.
- D.P.R.** Director of Public Relations (R.A.F.).
- D.P.S.** Director of Personal Services.
- D.R.** Dead reckoning; dispatch rider.
- D.R.L.S.** Dispatch Rider Letter Service.
- D.R.O.** Daily (or Divisional) Routine Order.
- D.S.** Decontamination Squad; Directing Staff.
- D.S.C.** Distinguished Service Cross.
- D.S.C.D.** Director of Small Craft Disposals.
- D.S.E.A.** Davis submarine escape apparatus.
- D.S.M.** Director of Servicing and Maintenance (R.A.F.); Distinguished Service Medal.
- D.S.O.** Distinguished Service Order.
- D.S.R.** Director of Scientific Research.
- D.T.A.C.F.** Director Territorial Army and Cadet Force.
- D.T.D.** Department of Technical Development.
- D.T.F.** Director of Flying Training (R.A.F.).
- D.T.O.** Director of Operational Training (R.A.F.).
- D.T.T.** Director of Technical Training (R.A.F.).
- Drv.** Driver.
- D.W.A.A.F.** Director of Women's Auxiliary Air Force.
- D.W.D.** Director of Weapon Development.
- D.Z.** Dropping zone.
- E.** Engineer; equipment.
- E.A.** Egyptian Army; enemy aircraft; Engineer Admiral (R.N.).
- E.A.A.S.** Empire Air Armament School.
- E.A.M.** *Ethnikon Apoletherotikon Metapon* (Gr.), National Liberation Front.
- E.A.N.S.** Empire Air Navigation School.
- E.C.** Engineer Captain (R.N.), Escort carrier.
- E.C.F.S.** Empire Central Flying School.
- Ech.** Echelon.
- E.D.** Efficiency Decoration.
- E.E.** Expeditionary Force.
- E.E.I.** Expeditionary Forces Institutes.
- E.E.M.** Expeditionary Forces Message.
- E.E.T.S.** Elementary Flying Training School; Empire Flying Training School.
- E.G.M.** Empire Gallantry Medal.
- E-in-C.** Engineer-in-Chief of the Fleet.
- E.L.A.S.** *Ethnikos Laikos Apoletherotikos Stratos* (Gr.), National Popular Liberation Army.
- E.L.Gr.** Engineer Lieutenant-Commander.
- E.L.S.** Express Letter Service.
- E.M.S.** Emergency Medical service.
- Eng.** Engineer.
- E.N.S.A.** Entertainments National Service Association.
- E.O.** Education (Engineer, Entertainments, Equipment or Establishments) Officer.
- E.R.A.** Engine-Room Artificer.
- E.R.S.** Empire Radio School.
- E.S.O.** Embarkation Staff Officer.
- Estabs.** Establishments.
- E.T.A.** Estimated time of arrival.
- E.T.C.** Emergency Training Centre.
- E.T.D.** Estimated time of departure.
- E.T.O.** European Theatre of Operations.
- E.T.P.S.** Empire Test Pilots' School.
- E.V.T.** Educational and Vocational Training.
- E.W.S.** Emergency water supply.
- F.** Fighter; photographic aircraft (U.S.).
- F.A.A.** Fleet Air Arm.
- F.A.M.O.** Forward Airfield Maintenance Organization.
- F.A.N.Y.** First Aid Nursing Yeomanry.
- F.A.P.** First Aid Party (or Post).
- F.A.U.** Friends' Ambulance Unit.
- F.B.** Fighter-bomber; fire brigade; flying-boat.
- F.C.** Fire control; fleet carrier.
- F.C.O.** Flying Control Officer.
- F.C.P.** Forward Control Post.
- Fd.** Field.
- F.D.B.** Fighter dive-bomber.
- F.D.L.** Forward defended localities.
- F.E.** Flight Engineer.
- F.E.U.** Forward Equipment Unit.
- F.F.** Free French; Frontier Force.
- F.F.F.** Fighting French Forces.
- F.F.I.** Free from infection; French Forces of the Interior.
- F.G.** Fire Guard; Foot Guards.
- F.G.C.M.** Field General Court Martial.
- FIDO.** Fog Investigation Dispersal Operation.
- F.L.** Flight Lieutenant.
- Flak.** *Fliegerabwehrkanone* (Ger.), anti-aircraft fire.
- Flt.** Flight.
- Flt. O.** Flight Officer (W.R.A.F.).
- F.M.** Field Marshal; Flight Mechanic.
- Fmn.** Formation.
- F.M.O.** Fleet Mail Officer.
- F.O.** Flag Officer; Flying Officer.
- F.O.I.C.** Flag Officer in Charge.
- F.O.O.** Forward Observation Officer.
- F.P.** Field punishment; fire picket.
- F.P.O.** Field Post Office.
- F.R.** Fighter reconnaissance.
- F.S.** Field security; field service; Fleet Surgeon; Flight Sergeant.
- F.S.M.O.** Field Service Marching Order.
- F.S.O.** Field Security Officer.
- F.S.P.** Field Security Personnel.
- F.S.P.B.** Field Service Pocket Book.
- F.S.R.** Field Service Regulations.
- F.T.B.** Fleet torpedo bomber.
- F.T.C.** Fleet torpedo officer.
- F.T.S.** Flying Training School.
- Fus.** Fusilier.
- Fw.** Focke-Wulf.
- F/W.** Fair-weather.
- Fwd.** Forward.
- G.** General Staff.
- G.A.F.** German Air Force.
- G.B.** Gunboat.
- G.C.** Gentleman Cadet; George Cross; Group Captain.
- G.C.A.** Ground-controlled approach (radar).
- G.C.C.** Group Control Centre.
- G.C.I.** Ground-controlled interception (radar).
- G.C.M.** General Court Martial.
- G.D.** General duties; ground defence.
- Gdsman.** Guardsman.
- G.E.** Garrison Engineer; Ground Engineer.
- Gen.** General.
- G.G.** Grenadier Guards.
- G.H.Q.** General Headquarters.
- G.I.** General (or Government) Issue (U.S.), hence, colloquially a U.S. soldier.
- G.L.** Gun-layer; gun-laying (radar).
- G.M.** George Medal.
- Gnr.** Gunner.
- G.N.T.C.** Girls' Nautical Training Corps.
- G.O.C.(-in-C.).** General Officer Commanding (-in-Chief).
- G.O.R.** Gun Operations Room.
- G.P.** General purposes.
- Sp.Capt.** Group Captain.
- G.P.O.** Gun Position Officer.
- G.P.R.** Glider Pilot Regiment.
- G.P.T.** General Purposes Transport.
- G.R.** General reconnaissance; Gurkha Rifles.
- G.R.O.** General Routine Order.
- G.S.** General service; General Staff.
- G.S.C.** General Service Corps.
- G.S.O.** General Staff Officer.
- G.S.P.** Good service pension.
- G.T.** Glider tug.
- G.T.C.** Girls' Training Corps.
- G.T.V.** Gun-towing vehicle.
- H.A.** High-angle.
- H.A.A.** Heavy anti-aircraft.
- H.A.C.** Honourable Artillery Company.
- H.C.F.** Honorary Chaplain to the Forces.
- H.D.** Heavy duty; Highland Division; Home Defence; horse-drawn.
- He.** Heinkel.
- H.E.** High explosive.
- H.F.** High-level fighter; Home Fleet; Home Forces.
- H.G.** Home Guard; Horse Guards.
- H.L.I.** Highland Light Infantry.
- H.M.A.C.** His Majesty's Aircraft Carrier.
- H.M.A.S.** His Majesty's Australian Ship.
- H.M.C.S.** His Majesty's Canadian Ship.
- H.M.F.** His Majesty's Forces.
- H.M.I.S.** His Majesty's Indian Ship.

- H.M.N.Z.S.** His Majesty's New Zealand Ship.
H.M.S. His Majesty's Ship.
H.M.T. His Majesty's Transport or Trawler.
H.O. Hostilities only.
How. Howitzer.
H.p. Half-pay.
H.Q. Headquarters.
H.S. Hospital Ship (R.N.).
H.S.M.S. High Speed Minesweeper.
H.T. Hired Transport; horsed transport.
Hvy. Heavy.
- I.** Instructor; Intelligence branch.
I.A. Immediate action.
I.A. Indian Army.
I.B. Incendiary bomb.
I.C. Intelligence Corps; internal combustion.
i/c. In charge; in command.
I.D.C. Imperial Defence College.
I.D.G. Inniskilling Dragoon Guards.
I.D.O. Inspecting Dental Officer.
I.D.S.M. Indian Distinguished Service Medal.
I.E. Initial equipment.
I.F.C. Instructor in Fire Control.
I.F.F. Identification friend or foe (radar).
I.G. Inspector-General; Instructor in Gunnery; Irish Guards.
I.M.A. Indian Military Academy.
I.N.A. Indian Nationalist Army.
Iad. Indian.
Inf. Infantry.
Int. Intelligence.
Intercom. Intercommunication.
I.O. Intelligence Officer.
I.O.M. Indian Order of Merit.
I.O.O. Inspecting Ordnance Officer.
I.O.R. Indian other rank.
I.R. Immediate reserves.
I.R.C. International Red Cross.
I.S.M. Imperial Service Medal.
Isum. Intelligence summary.
I.T. Indian troops.
I.T.C. Infantry Training Centre.
I.T.W. Initial Training Wing.
I.W.G.G. Imperial War Graves Commission.
I.W.T. Inland Water Transport.
- J.A.F.** Japanese Air Force.
J.A.G. Judge Advocate-General.
JATO. Jet-assisted take-off (U.S.).
J.C.(dr.). Junior Commander (W.R.A.C.).
Jesp. General purposes (G.P.) car.
ig. Junior grade (U.S.A.).
J.I.F. Japanese Imperial Forces.
J.P. Jet propulsion.
J.T.C. Junior Training Corps.
Ju. Junkers.
- K.B.** Kite balloon.
K.D. Khaki drill.
K.O.R.R. King's Own Royal Regiment.
K.O.S.B. King's Own Scottish Borderers.
- K.O.Y.L.I.** King's Own Yorkshire Light Infantry.
K.R. King's Regulations.
K.R.R. King's Royal Rifles.
K.R.R.C. King's Royal Rifle Corps.
K.S.K. Ethyl-iodo-acetate.
K.S.L.I. King's Shropshire Light Infantry.
- L.** Lancers; liaison aircraft; Lieutenant.
L.A.A. Light anti-aircraft.
L.A.C. Leading Aircraftman.
L.A.C.W. Leading Aircraftwoman.
L.A.D. Light Aid Detachment.
L/Br. Lance-Bombardier.
L.B.R. Line of bomb release.
L.C.A. Landing craft, assault.
L.C.C. Landing craft, control.
L.C.I. Landing craft, infantry.
L.C.M. Landing craft, mechanised.
L.C.P. Landing craft, personnel.
L/Cpl. Lance-Corporal.
L.Cr. Lieutenant-Commander.
L.C.R. Landing craft, rubber.
L.C.S. Landing craft, support.
L.C.T. Landing craft, tank.
L.C.V. Landing craft, vehicle.
Ldg. Landing.
L.D.V. Local Defence Volunteers.
LF. Lancashire Fusiliers; Land Forces, low level fighter.
L.G. Landing ground; Lewis gun; Life Guards.
L.H. Light Horse.
L.I. Light Infantry.
Lieut. Lieutenant.
L.M.F. Lacking in moral fibre.
L.M.G. Light machine-gun.
L.O. Liaison Officer.
Loc. Location.
Locstat. Location statement.
L. of C. Line(s) of communication.
L.O.S. Line of sight.
L.R.B. London Rifle Brigade.
L.R.D.G. Long Range Desert Group.
L.R.P. Long Range Penetration.
L.S. Leading Seaman.
L.S. & G.C.M. Long Service and Good Conduct Medal.
L.S.D. Landing ship, docks.
L/Sgt. Lance-Sergeant.
L.S.M. (R.). Landing ship, medium (rockets).
L.S.T. Landing ship, tank.
Lt. Lieutenant; light.
L.T. Leading Telegraphist.
L/T. Line telegraphy.
Lt.-Cdr. Lieutenant-Commander.
Lt.-Col. Lieutenant-Colonel.
Lt.-Gen. Lieutenant-General.
Lt-To. Leading Torpedoman.
L.V.T. Landing vehicle, tracked.
L.W.S. Light warning set (radar).
L.Z. Landing zone.
- M.** Master (pilot, etc.); mate; medical; mine-sweeper.
M.A. Military Assistant.
M.A.A. Master at Arms.
M.A.A.F. Mediterranean Allied Air Forces.
M.A.C. Merchant aircraft carrier; motor ambulance convoy.
M.A.E.E. Marine Aircraft Experimental Establishment.
Maj. Major.
- Maj.-Gen.** Major-General.
M. & D. Medicine and duty.
M. & T. Movements and Transportation.
M. & V. Meat and vegetables.
M.A.P. Medical Aid Post; Ministry of Aircraft Production.
M.A.R.U. Mobile Aircraft Reporting Unit.
M.A.T.S. Mediterranean Air Transport Service.
M.B. Motor-boat.
M.B.O. Medical Battle Organization.
Mc. Marine Craft Officer (R.A.F.).
M.C. Military Cross; Movement Control.
Mc. Motor cycle.
M.C.O. Movement Control Officer.
M.C.S. Military College of Science.
M.D. Medical Department (R.N.); Mines Department (R.N.).
M.D.S. Main Dressing Station.
M.D.U. Mobile Dental Unit.
Me. Messerschmitt.
M.E. Muzzle energy.
Mech. Mechanic.
Med. Medical; medium.
MEDME. Mediterranean and Middle East.
M.E.F. Middle East Forces.
M.E.L.F. Middle East Land Forces.
M.E.S. Military Engineer Services.
Met. Meteorological.
M.E.W. Ministry of Economic Warfare.
M.F.H. Mobile Field Hospital.
M.F.O. Military Forwarding Officer.
M.G. Machine-gun; Major-General.
M.G.A. Major-General, Administration.
M.G.B. Motor gunboat.
M.G.G.S. Major-General, General Staff.
M.G.O. Master-General of Ordnance.
M.I. Medical inspection; military intelligence.
Mid. Midshipman.
M.i.h. Miles in the hour.
Mil. Military; Militia.
Mk. Mark.
M.L. Minelayer; motor launch.
M.L.O. Military Landing Officer.
M.L.U. Mobile Landing Unit.
M.M. Military Medal; motor mechanic.
M.M.L. Manual of Military Law.
M.N. Merchant Navy.
M.O. Medical Officer; Meteorological Officer.
Mob. Mobile.
Mob.B.U. Mobile Bath Unit.
M. of F. Ministry of Food.
M.O.I. Ministry of Information.
Mon. Monitor (R.N.).
M.O.P. Ministry of Production.
M.O.R.U. Mobile Operations Room Unit.
M.O.S. Ministry of Supply.
M.P. Military Police.
M.P.I. Mean point of impact.
M.P.S.C. Military Provost Staff Corps.
M.R. Map reference.
M.R.A.F. Marshal of the Royal Air Force.
M.R.S. Medical Receiving Station.
- M.S.** Medical Services; Military Secretary; mine-sweeper.
M.S.A. Military Service Act.
M.S.F.U. Merchant Ships' Fighter Unit.
M.S.M. Meritorious Service Medal.
M.T. Mechanical transport; military training.
M.T. and S. Mechanical transport and supply.
M.T.B. Motor torpedo boat.
M.T.M. Mechanical transport mechanic.
M.T.O. Mechanical Transport Officer.
M.U. Maintenance Unit; mobile unit.
M.V. Motor vehicle; motor vessel; muzzle velocity.
M.W.T. Ministry of War Transport.
M.Y. Motor yacht.
- N.** Navigator.
N.A. Naval accounts; naval auxiliary; nursing auxiliary.
N.A.A.F.I. Navy, Army, and Air Force Institutes.
N.A.C. National Air Communications; Naval aircraftman.
N.A.C.D. National Association for Civil Defence.
N.A.R.P.A.C. National Air Raid Precautions for Animals Committee.
N.A.S.C. National Association of Spotters' Clubs.
Nav. Navigator.
N.C.A.C. Northern Combat Area Command.
N.C.C. Non-Combatant Corps, n.c.c. non-commissioned officer.
N.D.C. National Defence Company.
N.F. Night fighter.
N.F.S. National Fire Service.
N.I.D. Naval Intelligence Division.
N.I.T.I. Nose instantaneous, tail instantaneous (bomb).
N.L.O. Naval Liaison Officer.
N.O. Naval officer; navigation officer.
N.O.D. Naval Ordnance Department.
N.O.I.C. Naval officer-in-charge.
N.P.C. Naval Personnel Committee.
N.S. Graduated Royal Naval Staff College.
N.S.A. National Service Act(s).
N.S.C. National Savings Committee.
N.S.O. Naval Staff Officer.
N.T.O. Naval Transport Officer.
N.T.S. Naval Transport Service.
- O.** Observer; officer; operations.
O.A. Ordnance Artificer.
O.A.S. On active service.
O.C. Officer Commanding.
O.C.T.U. Officer Cadet Training Unit.
O.D. Ordnance Depot; other denominations.
O.E.R. Officers' Emergency Reserve.
O.F.C. Operator fire control.
Offr. Officer.
Offag. *Offizierlager* (Ger.), officers' prison camp.
O.F.P. Ordnance Field Park.
O.M.E. Ordnance Mechanical Engineer.

- O.O. Observation Officer; Operation Order; Orderly Officer; Ordnance Officer.
 O.O.W. Officer of the Watch.
 O.P. Observation post.
 Ops. Operations.
 O.R. Operations room; orderly room; other rank.
 Orbat. Order of battle.
 Ora. Ordnance.
 O.R.S. Orderly Room Sergeant.
 O.S. Ordinary Seaman, ordnance services.
 O.S.S. Office of Strategic Services (U.S.).
 O.T.C. Officers' Training Corps.
 O.T.S. Officers' Training School.
 O.T.U. Operational Training Unit.
 OE. Officer in charge of 2nd Echelon.
 O.U.A.S. Oxford University Air Squadron.
 O.W.I. Office of War Information (U.S.).
 O.W.L. Operator, wireless and line.
 P. Patrol-boat; personnel branch (R.A.F.); pursuit aircraft (U.S.).
 p.a.c. Passed advanced class, Military College of Science.
 P.A.C.U. Parachute and Cable Unit.
 P.A.D. Passive air defence.
 Palforce. Persia and Iraq Force.
 Paymr. Paymaster.
 P.B. Patrol boat; patrol bomber.
 P.B.I. "Poor bloody infantry."
 P.C. Paymaster Captain (R.N.). Paymaster Commander.
 P.D.C. Personnel Disposal Centre.
 P.D.G. Paymaster Director-General.
 Pdr. Pounder (guns).
 Pfc. Private first-class (U.S.).
 P.F.F. Pathfinder Force.
 P.H. Purple Heart (U.S. decoration).
 P.I. Point of Impact.
 P.I.A.T. Projector, infantry, anti-tank.
 Pl. Platoon.
 P.L. Paymaster-Lieutenant; plain language.
 Plt. Pilot.
 PLUTO. Pipe-line under the ocean.
 P.M. Paymaster; Provost-Marshall.
 P.M.C. President of the Mess Committee.
 P.M.R.A.F.N.S. Princess Mary's Royal Air Force Nursing Service.
 P.O. Petty Officer; Pilot Officer; Plotting Officer.
 P.O.L. Petrol, oil, and lubricants.
 P.O.R. Personnel Occurrence Report.
 P.O.Tel. Petty Officer Telegraphist.
 P.O.W. Prisoner of war.
 P.P. Petrol point.
 P.P.I. Plan position indicator (radar).
 P.R. Parachute Regiment; photographic reconnaissance; public relations.
 P.R.A. Paymaster Rear-Admiral.
 P.R.I. President of the Regimental Institute.
 Pro. Provost.
 P.R.O. Public Relations Officer.
 P.R.P. Petrol refilling point.
 P.R.U. Photographic Reconnaissance Unit.
 p.s.a. Passed R.A.F. Staff College.
 p.s.c. Passed Staff College.
 P.S.I. Permanent staff instructor; President of the Services Institute.
 P.S.L. Paymaster Sub-Lieutenant.
 P.S.T.O. Principal Sea Transport Officer.
 P.T. Physical Training.
 Pte. Private.
 P.T.I. Physical Training Instructor.
 p.u.n.s. Permanently unfit for naval service.
 P.V. Paravane; patrol vessel; private venture.
 P.W. Prisoner of war.
 P.W.C. Post-War Credit.
 P.W.R. Police War Reserve.
 P.X. Post Exchange (U.S.).
 Pz.Kw. *Panzerkraftwagen* (Ger.), tank.
 Q. Quartermaster's Branch.
 Q.A.I.M.N.S. Queen Alexandra's Imperial Military Nursing Service.
 Q.A.R.N.N.S. Queen Alexandra's Royal Naval Nursing Service.
 Q.D. Quarter Deck.
 Q.E. Quadrant elevation.
 Q.F. Quick-Bring.
 Q.M. Quartermaster; Queen's Messenger.
 Q.M.A.A.C. Queen Mary's Army Auxiliary Corps.
 Q.M.C. Quartermaster-General.
 Q.M.S. Quartermaster-Sergeant.
 Q.O. Qualified in Ordnance.
 R. Reconnaissance; rescue; reserve; rigid airship.
 R.A. Rear-Admiral; Royal Artillery.
 R.A.(A.). Rear-Admiral of Aircraft Carriers.
 R.A.A.F. Royal Australian Air Force.
 R.A.C. Royal Armoured Corps.
 R.A.Ch.D. Royal Army Chaplain's Department.
 R.A.(D.). Rear Admiral of Destroyers.
 R.A.D.C. Royal Army Dental Corps.
 R.Adm. Rear-Admiral.
 R.A.E. Royal Aircraft Establishment.
 R.A.E.C. Royal Army Educational Corps.
 R.A.F. Royal Aircraft Factory; Royal Air Force.
 R.A.F.O. Reserve of Air Force Officers.
 R.A.F.R. Royal Air Force Regiment.
 R.A.F.V.R. Royal Air Force Volunteer Reserve.
 R.A.M.C. Royal Army Medical Corps.
 R.A.M.O. Rear Airfield Maintenance Organization.
 R.A.N. Royal Australian Navy.
 R.A.O.C. Royal Army Ordnance Corps.
 R.A.P. Regimental aid post.
 R.A.P.C. Royal Army Pay Corps.
 R.A.P.W.I. Repatriation of Allied Prisoners of War and Internees.
 R.A.R.O. Regular Army Reserve of Officers.
 R.A.S.C. Royal Army Service Corps.
 R. Aux. A.F. Royal Auxiliary Air Force.
 R.A.V.C. Royal Army Veterinary Corps.
 R.B. Rifle Brigade.
 R.C. Recruiting centre; Red Cross.
 R.C.A.F. Royal Canadian Air Force.
 R.C.M. Regimental Corporal-Major (Household Cavalry).
 R.C.N. Royal Canadian Navy.
 R.C.N.C. Royal Corps of Naval Constructors.
 R.C.S. Royal Corps of Signals.
 R.D. Royal Naval Reserve Decoration.
 R.D.F. Radio direction-finder(-ing).
 R.D.X. Research Department Formula X (explosive).
 R.D.Y. Royal Dockyard.
 R.E. Royal Engineers.
 Recce. Reconnaissance.
 Ref. Reference.
 Regt. Regiment.
 R.E.M.E. Royal Electrical and Mechanical Engineers.
 Res. Reserve.
 R.E.S. River Emergency Service.
 R.F. Range-finder; Royal Fusiliers.
 R.F.A. Royal Field Artillery.
 R.F.C. Royal Flying Corps.
 Rfm. Rifleman.
 R.G.A. Royal Garrison Artillery.
 R.G.B. River Gunboat (R.N.).
 R.H.A. Royal Horse Artillery.
 R.H.Q. Regimental Headquarters.
 R.I. Rigorous imprisonment.
 R.I.A.F. Royal Indian Air Force.
 R.I.F. Royal Inniskilling Fusiliers; Royal Irish Fusiliers.
 R.I.N. Royal Indian Navy.
 R/L. Radiolocation.
 R.M. Royal Marines.
 R.M.A. Royal Marine Artillery; Royal Military Academy.
 R.M.C. Royal Military College.
 R.M.P. Regimental medical post; Royal Marine Police.
 R.N. Royal Navy.
 R.N.A.S. Royal Naval Air Service.
 R.N.C. Royal Naval College.
 R.N.D. Royal Naval Division.
 R.N.R. Royal Naval Reserve.
 R.N.S.C. Royal Naval Staff College.
 R.N.S.S. Royal Naval Scientific Service.
 R.N.V.R. Royal Naval Volunteer Reserve.
 R.N.V.S.R. Royal Naval Volunteer Supplementary Reserve.
 R.N.Z.A.F. Royal New Zealand Air Force.
 R.N.Z.N. Royal New Zealand Navy.
 R.O. Recruiting Officer; Reserve of Officers; Routine Order.
 R.O.C. Royal Observer Corps.
 R.O.F. Royal Ordnance Factory.
 R.O.O. Railhead Ordnance Officer.
 R.O.S. Regimental Orderly Sergeant.
 R.P. Refuelling point; rescue party; rocket projectile; Rules of Procedure.
 R.P.C. Royal Pioneer Corps.
 R.p.g. Rounds per gun.
 R.P./H. Repairs Party.
 R.P./L. Repairs Party, Light.
 R.P.O. Regulating Petty Officer.
 Rptd. Repeated.
 R.Q.M.C. Regimental Quartermaster-Corporal.
 R.Q.M.S. Regimental Quartermaster-Sergeant.
 R.R.C. Royal Red Cross.
 R.S.D. Rescue Service and Demolition.
 R.S.F. Royal Scots Fusiliers.
 R.Sigs. Royal Corps of Signals.
 R.S.M. Regimental Sergeant-Major.
 R.S.M.S. Rendering Safe of Mines Squad.
 R.S.R. Raiding Support Regiment (Artillery).
 R.S.U. Repair and Salvage Unit.
 R/T. Radio telephony.
 R.Tanks or R.T.C. Royal Tank Corps.
 R.T.O. Railway Transport Officer.
 R.T.R. Royal Tank Regiment.
 R.T.U. Returned to unit.
 R.U. Ready-use.
 R.U.R. Royal Ulster Rifles.
 R.V. Rendezvous.
 R.W. Royal Warrant.
 R.W.A.F.F. Royal West African Frontier Force.
 R.W.F. Royal Welsh Fusiliers.
 S. Signals.
 S.A. Semi-automatic; supply assistant (R.N.).
 S.A.A. Small arms ammunition.
 S.A.A.A. School of Anti-Aircraft Artillery.
 S.A.A.F. South African Air Force.
 S.A.C.S.E.A. Supreme Allied Commander, South-East Asia.
 S.A.D.F. South African Defence Force.
 S. & T. Supply and Transport.
 S.A.N.S. South African Naval Service.
 S.A.P. Semi armour-piercing.
 S.A.R. School of Aircraft Recognition.
 S.A.S. School of Air Support; Special Air Service.
 S.A.S.O. Senior Air Staff Officer.
 S.B. Signal boatswain; stretcher-bearer.
 S.B.A. Sick-bay attendant.
 S.C. Small craft; Staff Captain; Staff College.
 S.C.C. Sea Cadet Corps.
 S.C(dr). Senior Commander (A.T.S.).
 S.C.F. Senior Chaplain to the Forces.
 S.D. Service dress; special duties; staff duties; supply dropping.
 S.D.O. Senior Dental Officer; Signal Distributing Office.
 S/E. Single-engined.
 S.E.A.A.F. South-East Asia Air Forces.
 S.E.A.C. South-East Asia Command.
 S.E.A.L.F. South-East Asia Land Forces.
 Sec.Lt. Second-Lieutenant.
 S.Eq.S.O. Senior Equipment Staff Officer.

S.F.P. Supplementary Fire Party.	S.S.A.F.A. Soldiers', Sailors' and Airmen's Families Association.	T.M.D. Torpedo and Mines Department.	W. Warden.
S.F.T.S. Service Flying Training School or Squadron.	S/Sgt. Staff Sergeant.	Tn. Transportation (U.S.).	W.A. Western Approaches.
S.G. Scots Guards; seaman gunner.	S.S.M. Squadron (or Staff) Sergeant-Major.	T.O. Transport Officer.	W.A.A.C. Women's Army Auxiliary Corps (1914-1918).
Sg.C. Surgeon Captain (R.N.).	S.S.O. Station Staff Officer.	T.O.O. Time of origin.	W.A.A.F. Women's Auxiliary Air Force.
Sgmn. Signaller.	S.S.Q. Station Sick Quarters.	T.O.P. Total obscuring power.	W.A.C. Women's Army Corps (U.S.).
Sg.R.A. Surgeon Rear-Admiral.	Stalg. <i>Stammplatz</i> (Ger.). other ranks' prison camp.	T.O.R. Time of receipt.	W.A.V.E.S. Women Accepted for Volunteer Emergency Service (U.S. Navy).
Sgt. Sergeant.	S.T.C. Senior Training Corps.	Tp(s). Troop(s).	W.C. Wing Commander.
S.H.A.E.F. Supreme Headquarters, Allied Expeditionary Force.	Sto. Stoker.	T.P.M. Teleprint message.	W.D. War Department.
Sh.L. Shipwright Lieutenant.	S.T.O. Seaman Torpedoman.	Tpr. Trooper.	W.D.C. War Damage Commission or Contribution.
S.H.Q. Squadron Headquarters; Station Headquarters.	S.T.O. Sea Transport Officer.	Tpt. Transport.	Wdr.L. Wardmaster Lieutenant (R.N.).
S.I.B. Special Investigation Branch.	Strat. Strategic.	Tptr. Transporter; trumpet.	W.E. War emergency; war establishment.
Sig.L. Signals Lieutenant (R.N.).	Sub. Subaltern; submarine.	T.R. Torpedo-reconnaissance.	Wg. Wing.
Sigs. Signals.	Subs. Substantive.	T.S. Training Ship.	W.G. Welsh Guards.
S.I.O. Senior Intelligence Officer (R.A.F.).	Sup. Supply.	T/Sgt. Technical Sergeant (U.S.).	Wg.Cdr. Wing Commander.
Sitrep. Situation report.	S.V. Sailing vessel.	T.T. Target tug; torpedo-tube.	Wg.O. Wing Officer (W.R.A.F.).
Sit. Sergeant.	Svy. Survey.		W.L. Wagon lines.
S.L. Searchlight; Squadron Leader.	S.W. Shelter Warden.		W.L.A. Women's Land Army.
S.L.C. Searchlight control (radar).	S.W.B. South Wales Borderers.		W.M.T.C. Women's Mechanical Transport Corps.
S.Lt. Sub-Lieutenant.	S.W.O. Squadron (or Station) Warrant Officer.	U-boat. <i>Unterseeboot</i> (Ger.). submarine.	W.O. War Office; Warrant Officer; Wireless Operator.
S.M. Sergeant-Major.	Sy.P.O. Supply Petty Officer.	U/s. Unserviceable.	W.O.A.S. While on active service.
S.M.L.E. Short muzzle Lee Enfield (rifle).	T. Temporary; Territorial; torpedo; trainer.	U.S.A.A.F. United States Army Air Forces.	W.O.L. War Office letter.
S.M.O. Senior Medical Officer.	T.A. Target area; Territorial Army.	U.S.I. United Services Institute.	W.O.M. Wireless Operator Mechanic.
S.N.L.R. Services no longer required.	T.A.A. Territorial Army Association.	U.S.M.C. United States Marine Corps.	W.O.O. War Office Order; Warrant Ordnance Officer (R.N.).
S.N.O. Senior naval officer; senior navigating officer.	Tac (R). Tactical (reconnaissance).	U.S.N. United States Navy.	W Op. Wireless Operator.
S.O. Section Officer (W.R.A.F.); Signals Officer; Staff Officer.	T.A.F. Tactical Air Force.	U.S.O. United States Navy Organization (U.S.).	W.O.S.B. War Office Selection Board.
S.O.P. Sleeping-out pass.	T.A.N.S. Territorial Army Nursing Service.	U.S.S. United States Ship.	W.O.U. Wireless Observer Unit.
S.O.R. Sector Operations Room.	T.A.R.O. Territorial Army Reserve of Officers.	U.S.T.S. United States Transportation Service.	W.P. Warden's Post.
S.O.R.S. Struck off ration strength.	T.B. Torpedo-boat; torpedo bomber; training battalion.	U.X.B. Unexploded bomb.	W.R. Ward Room; War Reserve (Police).
S.O.S. Struck off strength.	T.B.D. Torpedo-boat destroyer.		W.R.A.C. Women's Royal Army Corps.
Sp. Support.	T.B.R. Torpedo-bomber-reconnaissance (aircraft).	V. <i>Vergeltungswaffe</i> (Ger.) reprisal weapon.	W.R.A.F. Women's Royal Air Force.
S.P. Self-propelled; Service Police; staging post; starting point; stirrup pump; stretcher party.	T.C. Training centre.	V.A. Vice-Admiral; virtualising allowance.	W.R.N.S. Women's Royal Naval Service.
S.P.O. Stoker petty officer.	T.C.O. Tactical Control Officer.	V.A.D. Voluntary Aid Detachment.	W/S. War substantive.
Spr. Sapper.	T.C.P. Traffic Control Post.	V.C. Vice-Chief; Victoria Cross.	W.S.G. War Service Grant.
S.P.S.O. Senior Personnel Staff Officer.	T.D. Territorial Decoration; torpedo depot; tractor-drawn.	V.C.A.S. Vice-Chief of the Air Staff.	W/T. Wireless telegraphy.
S.Q.M.S. Staff Quartermaster-Sergeant.	T.E. Tangent elevation.	V.C.O. Viceroy's Commissioned Officer.	Wtr. Writer (R.N.).
Sqn. Squadron.	T/E. Twin-engined.	V.C.P. Visual Control Post.	W.V.S. Women's Voluntary Services.
Sqn. Ldr. Squadron Leader.	Tel. Telegraphist; telephone(-ist, -y).	V.D. Velocity of detonation; Volunteer Decoration.	W.W. Warrant Writer (R.N.).
Sq.O. Squadron Officer (W.R.A.F.).	Telecoms. Telecommunications.	V.E. Velocity of explosion; Victory in Europe.	W.Wdr. Warrant Wardmaster.
S.R.E. Scientific Research and Experiments Department (R.N.).	T.E.W.T. Tactical exercise without troops.	V.G.O. Vickers gas-operated (machine-gun).	W.W.O. Wing Warrant Officer.
S.R.H. Supply railhead.	T.F. Territorial Force; torpedo fighter.	V.J. Victory over Japan.	
S.S. Services of Supply (U.S.).	T.L. Target indicator; Technical Instructor; telescope identification.	V.L.R. Very long range.	Y. & L. York and Lancaster Regiment.
	Tk. Tank.	V.O. Veterinary officer.	Yeo. Yeomanry.
	Tk. Telegraphist Lieutenant; Torpedo Lieutenant.	Vol. Volunteer.	Y.S.B. Young Soldiers' Battalion.
	T.M. Training memorandum.	V.P. Vulnerable point.	
		V.R. Volunteer Reserve.	
		V/T. Visual Telegraphy.	
		V.t.m. Vehicles to the mile.	
		V.W.C. Vickers water-cooled machine-gun.	
		V.Y. Victualling yard (R.N.).	
			Z. Zero hour.

Section IV. SCIENTIFIC AND TECHNICAL

Here are given such abbreviations used in scientific and technical work as are likely to be met with in general scientific reading by students and amateurs. The branches included are chemistry, physics, electricity, mechanics, radio, aeronautics, engineering.

A. Absolute temperature; ampere; Angström; Argon.	A.I. Appleton layer	B. Baumé; boron; brightness; flux density; magnetic induction.	B.O.T. Board of Trade unit.
a (alpha). Alpha rays; specific rotation.	alt. Altitude.	b. Susceptance.	b.p(t). Boiling point.
Ab Alabamine.	amp. Ampere.	β (beta). Beta rays.	Br Bromine.
Ac Actinium.	a.r. Air resistance.	Ba Barium.	B.R.C. British reinforced concrete.
A.C. Alternating current.	As Arsenic.	Bab. Babington.	B.S.I. British Standards Institution.
A.C.E. Automatic computing engine.	a.s. Airscrew.	B.A.Ohm. British Association unit of resistance.	B.S.S. British Standards Specification.
A.F. Audio-frequency.	A.T. Ampere turns.	B.C. Bayonet cap.	B.S.W. British Standard Whitworth.
A.F.C. Automatic frequency control.	at. Atomic.	B.D.C. Bottom dead centre.	B.S.W.G. Brown & Sharpe, or American, wire gauge.
Ag Silver.	Athodyl. Aero-thermo-dynamic duct.	Be Beryllium.	B.Th.U. British thermal unit.
Ah. Ampere-hour.	Au Gold.	b.h.p. Brake horse power.	B.T.U. Board of Trade unit.
A.H.M. Ampere-hour meter.	A.u. Angström unit.	Bi Bismuth.	B.W.G. Birmingham wire gauge.
Al Aluminium.	A.V.C. Automatic volume control.	Bicarb. Bicarbonate.	
	A.W. Atomic weight.	B.M. Bending moment; bench mark.	
	A.W.G. American wire gauge.		

- C. Calorie, large; capacitance; capacity; carbon; centigrade; coulomb.
 c. Calorie, small; current; velocity of light in vacuo.
 Ca Calcium.
 cal. Calorie.
 Cb Columbium.
 C.B. Central battery.
 C.C. Continuous current; cotton covered.
 c.c. Cubic centimetre.
 Cd Cadmium.
 Ce Cerium.
 cel. Cellulose.
 C.G. Centre of gravity.
 cg. Centigramme.
 C.G.I. Corrugated galvanized iron.
 C.G.S. Centimetre-gramme-second (system of units).
 C.I. Cast iron; compression ignition.
 C.I.E. Compression ignition engine.
 Cl Chlorine.
 cm. Centimetre.
 Cn Cyanogen.
 Co Cobalt.
 cos. Cosine.
 cosec. Cosecant.
 cot. Cotangent.
 c.p. Candle power.
 C.P.S. Cycles per second.
 Cr Chromium.
 C.R. Cold rolled; compression ratio; copper resistance.
 cr.p. Critical pressure.
 cr.t. Critical temperature.
 Cs Caesium.
 Cu Copper.
 C.W. Continuous waves.
 D. Deuterium; electrostatic flux density.
 d. Diopter; dorsal.
 d. Specific gravity (chem.).
 db. Decibel.
 D.C. Direct current; standard thickness of plating.
 D.C.C. Double cotton covered.
 DDT. Dichloro-diphenyl-trichlorethane (insecticide).
 D.F. Direction finding.
 Di Didymium.
 D.P. Double-pole.
 D.P.C. Damp-proof course.
 D.S.C. Double silk covered.
 D.T. Double throw.
 Dy Dysprosium.
 E. Earth; elasticity modulus; electro-motive force; illumination; permittivity; voltage.
 e. Base of logarithms; charge on electron; elasticity coefficient; strain.
 ϵ (epsilon). Dielectric constant; electric force; electrode potential.
 E.D. Electro-dynamic.
 E.H.P. Effective horse power; electrical horse power; extra high pressure.
 E.H.T. Extra high tension.
 el. Element.
 E.M.F. Electro-motive force.
 E.M.U. Electro-magnetic unit.
 Er Erbium.
 E.S.U. Electro-static unit.
 Eu Europium.
 F. Fahrenheit; farad; fluorine; force; luminous flux.
 f. Frequency; function.
 f. Aperture of lens.
 Fe Iron.
 f.h.p. Fractional horse power.
 f. Fluid.
 F.M. Frequency modulation.
 f.p. Freezing point.
 f.p.s. Foot-pound-second (system of units).
 Fr Florentium.
 freq. Frequency.
 F.S. Factor of safety.
 f.s. Foot-seconds.
 F.W.G. French wire gauge.
 G. Centre of gravity; gully; leakage.
 g. Acceleration due to gravity; conductance; gramme; gravitation.
 γ (gamma). Gamma rays (radioactive).
 Ga Gallium.
 Gd Gadolinium.
 Ge Germanium.
 Gl Glucinum.
 H. Henry (unit of inductance); horizontal component of intensity of magnetization; hydrogen.
 H. and D. Hurter and Driffield curve (speed of photographic films).
 H.E. Heat engine; horizontal equivalent; hydraulics engineer.
 He Helium.
 Hf Hafnium.
 H.F. High frequency.
 H.F.C. High frequency current.
 Hg Mercury.
 H.M.D. Hydraulic mean depth.
 Ho Holmium.
 h.p.n. Horse power nominal.
 H.R. Half-round.
 H.T. High tension.
 H.V. High voltage.
 hy. Henry (unit of inductance).
 I. Current; inertia; iodine; luminous intensity.
 i. Angle of incidence; electric current; intermittent.
 I.A. International Angström.
 I.C.E. Internal combustion engine.
 I.F. Intermediate frequency.
 I.H.P. Indicated horse power.
 Il Illyrium.
 In Indium.
 I.P. Input primary.
 Ir Iridium.
 I.S. Input Secondary.
 J. Intensity of magnetization; joule.
 K. Capacity; dielectric constant (old); heat loss coefficient; potassium.
 k. Magnetic susceptibility; radius of gyration.
 kc. Kilocycle.
 kc/s. Kilocycles per second.
 Kg.-cal. Kilogramme-calorie.
 kin. Kinetic.
 Km. Kilometre.
 Kv Krypton.
 Kv Kilovolt (1,000 volts).
 kVA. Kilovolt-ampere (1,000 volt-amperes).
 kVAR. Kilovar (reactive or wattless kVA).
 kW. Kilowatt (1,000 watts).
 kWh. Kilowatt hour (1,000 watt-hours).
 L. Self-inductance (coefficient); quantity of light.
 λ (lambda). Friction angle; wavelength.
 La Lanthanum.
 lat. ht. Latent heat.
 ld. Load.
 L.F. Low frequency.
 Li Lithium.
 log. Logarithm.
 L.T. Low tension.
 Lu Lutecium.
 L.W. Lime white.
 l.y. Light-year.
 M. Mach. number; mass; mutual inductance; 1,000.
 m. Metre; minim; minute (time or angle); momentum; strength of magnetic pole.
 μ (mu). Friction coefficient; micron; permeability (magnetism); refractive index.
 Ma Masurium.
 M.A. Mechanical advantage.
 mA. Millimetre.
 met. Metal.
 μ F or μ d. Microfarad.
 Mg Magnesium; milligramme.
 mho. Unit of conductivity.
 mH. Microhenry.
 mil. Unit of angular measurement; 1/1,000 inch (in f.p.s. system).
 mist. Mishura (Latin), mixture.
 M.K.S. Metre-kilogramme-second (system of units).
 mm. Millimetre.
 M.M.F. Magneto-motive force.
 Mn Manganese.
 Mo Molybdenum.
 mol. Molecule.
 MVA. 1,000 kVA (1 million volt-amperes).
 M.W. Molecular weight.
 M Ω . Megohm.
 N Nitrogen.
 Na Sodium.
 N.A. Neutral axis.
 Nb Niobium.
 Nd Neodymium.
 Ne Neon.
 N.G. Nitro-glycerin.
 Ni Nickel.
 N.I. Non-inductive.
 nit. Nitrate; nitric.
 Nt Niton.
 N.T.P. Normal temperature and pressure.
 nuc. Nucleus.
 O Oxygen.
 ω (omega). Ohm; radian.
 O.H. Overhead transmission.
 O.H.V. Overhead valve.
 O.P. Output primary.
 orb. Orbital.
 Os Osmium.
 O.S. Output secondary.
 ox. Oxalate; oxide.
 Oz. Ozone.
 P. Phosphorus; pitch (of gears); power; pressure per unit area.
 p. Particle.
 π (pi). Ratio of diameter to circumference (3.14159... in.)
 Pa Protoactinium.
 P.A.B.X. Private automatic branch exchange.
 Pb Lead (metal).
 P.B.X. Private branch exchange.
 P.C. Portland cement; prime cost.
 Pd Palladium.
 P.D. Potential difference.
 P.E.(C). Photo-electric cell.
 pH. Hydrogen-ion concentration.
 Po Polonium.
 pot. Potential.
 Pr Praseodymium; proton.
 Pt Platinum.
 P.V.C. Polyvinyl chloride (class of plastics).
 P.X. Private exchange.
 Q. Charge; quantity (of electricity).
 R. Réaumur; resistance.
 r. Radius.
 Ra. Radium.
 rad. Radial; radiation; radio; radius; root.
 Rb Rubidium.
 R.C. Reinforced concrete.
 RDX. Explosive for bombs, introduced 1944.
 Re Rhenium.
 R.F. Radio-frequency.
 Rh Rhodium.
 R.I. Refractive index.
 R.M.S. Root mean square.
 Rn Radon.
 r.p.m., r.p.s. Revolutions per minute, per second.
 R.S.B. Rolled steel beam.
 R.S.J. Rolled steel joist.
 R.T. Radiotelephony.
 Ru Ruthenium.
 S. Reluctance; sulphur.
 Sa Samarium.
 Sb Antimony.
 Sc Scandium.
 S.C. Silk covered; stopcock; super-calendered.
 S.C.C. Single cotton covered.
 Se Selenium.
 S.E. Stopped end.
 S.G. Specific gravity.
 s.h.p. Shaft horse power.
 Si Silicon.
 Sm Samarium.
 Sn Tin.
 S.P. Single-pole; soil-pipe.
 Sr Strontium.
 S.R. Specific resistance.
 S.S.C. Single silk covered.
 S.T. Single throw.
 s.t. Static thrust.
 S.W.G. Imperial standard wire gauge.
 T. Period; transmission factor.
 t. Time.
 Ta Tantalum.
 tan. Tannin.
 Tb Terbium.
 T.D.C. Top dead centre.
 Te Tellurium.
 Th Thorium.
 Ti Titanium.
 Tl Thallium.
 Tm Thulium.
 T.N.C. Tri-nitro-cellulose.
 T.N.P. Tri-nitro-phenol.
 T.N.T. Tri-nitro-toluol.
 T.P. Triple-pole.
 t.p.i. Teeth (threads) per inch.
 T.V.R. Temperature variation of resistance.
 U Uranium.
 V. Potential difference; vanadium; volt; volume.
 v. Specific volume; vector; velocity.
 V.A. Volt-ampere.
 val. Valency.
 Vi Virginium.
 V.I. Vertical interval.
 V.I.R. Vulcanized india-rubber.
 V.P. Vanishing point; ventilating pipe.
 V.R. Velocity ratio.
 W. Tungsten; watt; weight.
 w.g. Wire gauge.
 Wh. Watt-hour.
 WL. Wave length.
 W/T. Wireless telegraphy.
 X. Reactance.
 x. Mass susceptibility.
 Xe Xenon.
 X's. Atmospherics.
 x tgd. Cross tongued.
 Y. Admittance; yttrium.
 Yb Ytterbium.
 Yt Yttrium.
 Z. Impedance.
 Zn Zinc.
 Zr Zirconium.

Abbreviators. Name given to certain officials formerly employed by the popes. They are first mentioned in the 14th century, their work being to outline and prepare the groundwork of papal bulls, briefs, and decrees. They were suppressed when Pius X reformed the papal chancery in 1908. Their number varied, but when they were formed into a college by Sixtus IV (1471-84) it was fixed at 72.

Abd-el-Aziz, MULAI (1878-1943). Sultan of Morocco, 1894-1908. Son of Mulai-Hassan III, his sympathy with European ways led to a rebellion, and the southern tribes proclaimed his brother Mulai Abd-el-Hafid sultan. Abd-el-Aziz sought aid from the Great Powers, but finally abdicated and retired on a pension. He died at Tetuan, June 9, 1943.

Abd-el-Kader (c. 1807-83). Algerian patriot. Born near Mascara, he was a sheriff—i.e. a descendant of Mahomet—and early performed the pilgrimage to Mecca. He was proclaimed ameer of Mascara in 1832, and, after a protracted war against the French, made formal submission to the governor of Algiers, the duc d'Aumale, in 1847. He lived in France until 1852 and at Brussa and Damascus, where he died.

Abd-el-Krim. Moroccan chief: son of a caid of the Beni Uriaghel tribe inhabiting the mountainous Rif country. Employed in 1919 in the office of Native Affairs at Melilla, he quarrelled with General Silvestre, commanding the Spanish troops, and returned to the Rif. In 1921 at the head of a few hundred tribesmen he attacked a Spanish advanced post at Anual and carried it by storm. In the fighting that followed 16,000 of the 19,000 composing the Spanish army were either killed or taken prisoner. By the end of 1924 Abd-el-Krim was in control of all Spanish Morocco except Tetuan. He invaded the French zone, but in 1926 surrendered and was exiled to Réunion. Though permitted in 1947 to reside in France, he escaped to Egypt.

Abd-el-Kuri OR PALINURUS SHOAL. Islet off the S. coast of Arabia. It is a dangerous reef of rock and coral, about 8 m. from the mainland, and a little over 1 m. long. It was discovered in 1835.

Abdera. Ancient Greek town, on the S. coast of Thrace and the Aegean Sea. It was the birthplace of the philosophers Democritus and Protagoras. The inhabitants

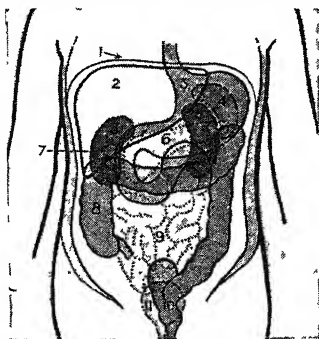
were generally considered stupid, and to call a person an Abderite was equal to calling him a fool.

Abd-er-Rahman, variant spelling of Abd-ur-Rahman (q.v.).

Abdication (Lat. *ab*, from; *dicare*, to proclaim). Word applied to the act of sovereigns who voluntarily give up their thrones. Famous examples are those of Edward VIII in 1936, Napoleon in 1814 and 1815, and the emperor Charles V in 1556. Other noteworthy instances are Christina of Sweden, 1654; Ferdinand, emperor of Austria, 1848; Milan of Serbia, 1889; Carol of Rumania, 1940.

Abdiel. Name given by Milton to the seraph who, in *Paradise Lost* (vv. 805-907), withstood Satan and other rebel spirits. "Among the faithless, faithful only he."

Abdomen. Cavity of the body lying between the large horizontal muscle called the diaphragm and



Abdomen. Torso opened to show: 1, Diaphragm. 2, Liver. 3, Stomach. 4, Spleen. 5, Kidneys. 6, Pancreas. 7, Gall Bladder. 8, Large intestine. 9, Small intestine. 10, Rectum. 11, Bladder.

the bones and muscles forming the pelvis. The principal organs contained in the abdomen are the stomach and intestines, liver, spleen, pancreas, kidneys and bladder, and in both sexes organs of reproduction. Anatomists divide the surface of the abdomen into nine regions by means of two horizontal and two vertical lines, the three central regions being termed, from above downwards, the epigastric, umbilical and hypogastric, and those at the sides, the right or left hypochondriac, lumbar, and iliac.

In the lower phyla, or orders, of the animal kingdom there is no persistent distinction between the abdomen and the thorax or chest, though the general body cavity is often composed of two divisions. It may be regarded as beginning with the arthropoda. In the

insects and their allies the abdomen, generally divided from the thorax by a narrow constriction, is usually segmented or divided externally into rings, which may bear appendages, as in the Crustacea. In the human species and in the anthropoids an erect habit has caused the abdomen to become the lower part of the body cavity. Commonly known as the belly, it is enclosed by a muscular body wall, lined by a smooth membrane known as the peritoneum, which facilitates the peristaltic movements of the viscera. See *Anatomy*; *Liver*; *Stomach*, etc.

Abduction (Lat. *ab*, from; *ducere*, to lead). Crime relating to offences against women and children. It is chiefly associated with motives of robbery or unlawful knowledge. There can be no abduction of a male person over the age of 14. Whosoever unlawfully, either by force or fraud, takes away, entices or detains any child under the age of 14 with intent to deprive any person who has the lawful custody of such child of the possession of the child, or with the intent to steal any article upon or about the child, is guilty of felony, and may be sentenced to imprisonment for any period not exceeding seven years.

Where a woman of any age has an interest in any real or personal estate, it is felony to take away or detain her with intent to marry her or know her, and punishable by 14 years' imprisonment. Any person who takes a girl under the age of 18 out of the custody of her parents or other person having the lawful care of her, and with the intention that she should be known, is guilty of a misdemeanour. When the girl is under 16 criminal intent is not necessary, and an offence is committed by anyone who takes her away out of the possession of, and against the will of, her parents or guardians. Any person who detains any woman or girl against her will in any premises with intent that she may be known is guilty of a misdemeanour. These three offences are all punishable by two years' imprisonment.

Abdul Aziz (1830-76). Sultan of Turkey. Born Feb. 9, 1830, second son of Sultan Mahmud II, he succeeded his brother Abdul Mejid in 1861. He devoted his energies chiefly to amassing and squandering wealth, obtaining large sums from the khedive Ismail in return for extended prerogatives and a new law of succession. In 1867 he toured in Europe,

visiting London and Paris. His incapacity and extravagance provoked discontent. He was deposed May 30, 1876, and found dead in his apartments June 4, 1876.

Abdul Hamid I (1725-89). Sultan of Turkey. Son of Sultan Ahmed III, he succeeded his brother Mustapha III in 1773. Early in July, 1774, the Turkish army was defeated by the Russians, and on July 21 Abdul Hamid signed the treaty of Kuchuk Kainarji, involving the loss of Turkish suzerainty over the Crimea and other Tartar districts. Another war, with Russia and Austria, resulted in the fall of Ochakov in 1788 after a long siege. Abdul Hamid died April 7, 1789.

Abdul Hamid II (1843-1918). Sultan of Turkey. Born Sept. 22, 1842, second son of the Sultan Abdul Mejid, he became sultan on Aug. 31, 1876, on the deposition of his brother Murad V. His long reign witnessed many changes in



Abdul Hamid II,
Sultan of Turkey

Turkey, mainly losses of territory and increased foreign control over the Ottoman government and finances. A clever diplomat, he skillfully played off the Powers of Europe against

one another, but his empire was always in disorder, and the Armenian massacres in 1896 won for him the titles of The Great Assassin and Abdul the Damned. In April, 1909, the Young Turks under Enver Bey rose in revolt, and the National Assembly voted his deposition. Accepting his fate without a struggle, he became a state captive at Salonica, and in 1915 he was removed, first to Smyrna and then to Magnesia. Abdul Hamid was largely responsible for the influence gained by Germany in Turkey. He died in Constantinople, Feb. 11, 1918. See Abdul Hamid, Edwin Pears, 1917.

Abdul Ilah, AMEER. Regent of Iraq; uncle of King Feisal II. In April, 1941, while absent from Baghdad, he was deposed by Rashid Ali, a politician with pro-Nazi sympathies, and took refuge



Abdul Ilah,
Regent of Iraq

in Transjordan. After the revolt had been put down by British intervention in Iraq, Abdul Ilah was reinstated and returned to Bagdad on June 1, 1941.

Abdullah, IBN HUSSEIN (b.1882).



Ibn Hussein Abdullah,
King of Transjordan

First king of Transjordan. Born in Mecca, second son of King Hussein of the Hejaz and elder brother of King Feisal I of Iraq, he was recognized in April, 1921, as

ameer of the independent state of Transjordan (from 1949, Jordan). His relationship with the U.K. was established by treaty in 1923, and in 1946 the U.K. recognized Transjordan as a sovereign state, Abdullah assuming the title of king. In 1948 he proclaimed himself king of Palestine also, a step neither approved by other members of the Arab League nor recognized elsewhere. See Transjordan.

Abdul Mejid (1823-61). Sultan of Turkey during the Crimean War. The eldest son of Mahmud II, he succeeded July 1, 1839, when the Turkish army and fleet surrendered to the Egyptian viceroy Mehemet Ali. However, the Great Powers intervened to protect Turkey. Abdul Mejid continued his father's reforms. In 1839 he proclaimed the rights of all subjects irrespective of creed. The status of Christians in Turkey and the general tone of the administration were greatly improved by this edict. He died June 25, 1861.

Abd-ur-Rahman. Name of several Arab rulers. One, a follower of Mahomet, on the death of Omar in 644, refused the caliphate to which he had been nominated. Another was leader of the Saracen hosts which were defeated by Charles Martel at Tours in 732. Three, members of the Ommiad family were caliphs of Cordova. Abd-ur-Rahman I founding this caliphate in 756, after his escape from Bagdad when the city was taken by the Abbasides. Abd-ur-Rahman II, the fourth caliph, was distinguished by his love of luxury and display, and his encouragement of architecture, music, and literature. He died in 852. Abd-ur-Rahman III was caliph from 912-61. He waged many wars against neighbouring rulers, recovered much territory lost by his predecessors, and enlarged the boundaries of his kingdom.

Abd-ur-Rahman (1830-1901). Ameer of Afghanistan. Grandson of the great ameer Dost Mohammed, he was driven out of Afghanistan when he first claimed the succession. In 1880, at the close of the second Afghan War, he was the candidate acknowledged by the British. He proved himself a strong and shrewd ruler, with a thorough understanding of his position as between Russia and Great Britain. He preserved the independence of his country, and his wisdom at the time of the Penjdeh incident in 1885 averted what seemed to be inevitable war between the two Great Powers. On his death, Oct. 3, 1901, he was succeeded by his son Habibullah. See Under the Absolute Amir, Frank A. Martin, 1907.



Abd-ur-Rahman,
Afghan Ameer

Abd-ur-Rahman (1778-1859). Sultan of Morocco 1823-59. His reign is chiefly notable for the abandonment of the claim to tribute levied by the rulers of Morocco on European ships in the Mediterranean. This was to secure them from the attacks of pirates, who became troublesome again as soon as the new arrangement was concluded.

Abecedarian Hymns. Hymns composed in imitation of Hebrew acrostic poetry. In these each verse or part commenced with the first and succeeding letters of the alphabet in their order.

Abecedarians (Lat. *abecedarius*, pertaining to the alphabet). Familiar name of an Anabaptist sect founded in Germany by Nicolaus Storch in the 16th century. They held that all human knowledge prevented men from inwardly hearing God's voice, and refused to learn even the alphabet, or A B C—hence the nickname.

a Beckett, GILBERT ABBOTT (1811-56). English humorous writer and dramatist. Born in London, Feb. 17, 1811, he was educated at Westminster and called to the bar. In 1831 he established Figaro in London, and was a constant contributor to Punch from the start of that journal in 1841 until his death, at Boulogne.



G. A. a Beckett,
English humorist

Aug. 30, 1856. His principal works were *The Comic Blackstone*, 1846; *Comic History of England*, 1857-8; and *Comic History of Rome*, 1852. See *The à Becketts of Punch*, 1903, by his son. Arthur Wilham (1844-1909).

Abed-Nego. Name given in Babylon to the exiled Jew, Azariah (Dan. 1-3), friend of Daniel. He received honour and office from Nebuchadnezzar, until, refusing to worship a golden image, he was thrown into a burning furnace. Having miraculously escaped uninjured, he was restored to office.

Abel. Second son of Adam and Eve. A shepherd, he was killed by his brother Cain because of their two sacrifices Abel's was more acceptable to God (Gen. 4). He is alluded to in the N.T (Matt. 23; Heb. 11).

Abel, SIR FREDERICK AUGUSTUS, BART. (1827-1902). British chemist. Born at Woolwich, July 17, 1827, Abel studied at the Royal College of Chemistry, and afterwards acted as assistant to A. W. Hofmann. He conducted research work in aniline derivatives, and prepared one of the first specimens of gun-cotton made in England. In 1852 he became professor of chemistry at the R.M.A., Woolwich, and four

years later he was appointed chemist to the War Office, retaining this position until



Sir F. A. Abel,
British chemist
Elliot & Fry

process by which perfectly stable gun-cotton can be made. His most important work was the invention, in conjunction with Sir James Dewar, of cordite, which was patented in 1889. The Abel test for petroleum, also known as the closed test, was devised by him. At the time of his death, Sept. 6, 1902, Abel was Director of the Imperial Institute.

Abel, ROBERT (1859-1936). English professional cricketer. Born at Rotherhithe, Nov. 30, 1859, he first played for Surrey in 1881, and during his cricket career made over 70 separate centuries, his highest score being 357 not out against Somerset in May, 1899. In Aug., 1899, he and Hayward in partnership scored 448 against Yorkshire at the Oval. In each of the eight seasons 1895 to 1902 he compiled over 2,000 runs (3,309 in 1901). The "guy'nor," as Abel was generally called, was a mainstay of the Surrey XI until his retirement in 1904. He died Dec. 10, 1936.



Robert Abel,
English cricketer
Elliot & Fry

Abélard, PIERRE (1079-1142). French scholastic philosopher and theologian. Born at Le Pallet, near Nantes, Brittany, he sacrificed his heritage and health to the pursuit of knowledge, becoming a rival to his former master, the dialectician William of Champeaux. A thinker of subtle and commanding intellect, in 1115 he was appointed lecturer at the cathedral school of Notre Dame, Paris, and from all parts of Europe drew students, including Peter Lombard and Arnold of Brescia. In the house of Fulbert, a canon

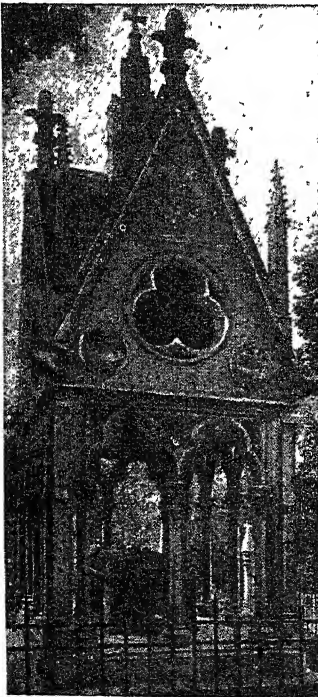
of Notre Dame, Abélard was tutor to his host's niece, the accomplished and beautiful Héloïse, with whom he fell passionately in love. A son was born, and the two were then privately married in Brittany, with Fulbert's consent. But when Héloïse, in order not to mar Abélard's career in the Church, fled to the convent of Argenteuil, her uncle, in revenge, caused Abélard to be castrated, in the hope that all chance of preferment would be denied him. Thus maimed and humbled, Abélard, whose scholastic fame had made him many enemies, retired to the abbey of S. Denis, and induced Héloïse to take the veil. During the remainder of his life he was continuously pursued with charges of heresy, particularly in reference to his views on the Trinity. Condemned by the synod of Soissons in 1121, he afterwards built a hermitage at Nogent-sur-Seine, and a chapel dedicated to the Holy Ghost. Here he regained some of his former fame.

Appointed abbot of S. Gildas de Rhuy, Brittany, he founded at Nogent the abbey of The Paraclete, appointing Héloïse first abbess. Then were written the famous letters which inspired Pope's Epistle of Eloisa to Abélard, and have served more than anything else to preserve the memory of their writers. Persecuted by Bernard of Clairvaux and others, in 1141 Abélard was condemned for heresy by the council of Sens. It was while on his way to Rome to perform the prescribed penance that when at Cluny he won the friendship of Peter the Venerable, who reconciled him to Bernard and the pope. Broken in health, he died, April 21, 1142, at the priory of S. Marcel near Chalon-sur-Saône. He was buried at The Paraclete, as was Héloïse twenty-two years later. In 1817 the remains of the lovers were interred at Père-Lachaise, Paris.

Abélard's teaching was an appeal to reason against tradition. His works were written in Latin, and first printed in Paris, 1616. A hymn by Abélard, *O quanta qualia!* (O what the joy and the glory must be!) is in popular use in the Church of England.

Bibliography. Biographies: J. McCabe, 1901; J. G. Sikes, 1932. Letters: ed. C. K. Scott-Moncrieff, 1925. Novels: Héloïse and Abélard, George Moore, 1921; Peter Abélard, Helen Waddell, 1933.

Abele (Dutch, *abeel*). Alternative name for the white poplar (*Populus alba*). See Poplar.



Abélard and Héloïse. Tomb in
Père-Lachaise cemetery, Paris

Abel Test. Mode of testing petroleum so as to ascertain the temperature at which it gives off inflammable vapour. The test is named after Sir Frederick Abel and is described in schedule I of the Petroleum Act, 1879.

The object of the test is to find out whether a sample of petroleum is safe under ordinary conditions of storage and use. Experiment showed that oil which gives off inflammable vapour only when

principal members were massacred by Boabdil in the Hall of the Abencerrages in the Alhambra. On this incident Chateaubriand based a play and Cherubim an opera. See Spain: History.

Abeokuta. Town of Nigeria, in the Yoruba territory. Capital of Egba district, on the Ogun river, 60 m. by rly. N. of Lagos, the town, or rather group of towns and villages, covers a large area, and is enclosed by a high mud

wall. Founded in 1825 as a refuge from the incursions of the slave-hunters of Dahomey and Ibadan, the various tribes constituted it a free confederacy while retaining their separate religions and customs. Frequently attacked, notably in 1851 by Gezo, king of Dahomey, it resisted all attempts to capture it.

Greatly improved in recent years, it has courts of justice, government buildings, and waterworks opened in 1914, and is the centre of an active trade in palm oil, rubber, timber, and other local produce and European manufactured goods. Following disturbances in 1914, the Alake, or president of the council of chiefs, placed the district of Egba under the direct control of the Nigerian Government. Pop. 45,763.

Aberaman (Celtic *aber*, mouth). Ecclesiastical district and village of Glamorganshire, Wales. It is contiguous to Aberdare, is served by rly., and there are adjacent collieries. Pop. 15,063.

Aberavon. Town of Glamorganshire, Wales; part of Port Talbot. On the right bank of the Avon, 11 m. E. by S. of Swansea, the town grew with the industrial development of S. Wales, and has large tinplate and engineering works. Cwmavon, with important copper-smelting works, lies about 2 m. to the N.E. Aberavon gives its name to a county division which returns one member to Parliament. Market day, Sat. Pop. 16,848.

Aberbrothock. Old name of the Scottish town of Arbroath (*q.v.*).

Abercarn. Urban district and town of Monmouthshire, England. It is in the Ebbw valley 10 m. N.W. of Newport on the railway, with collieries and iron,

tinplate, and chemical works. Market day, Sat. Pop. 20,123.

Aberconway, CHARLES BENJAMIN BRIGHT McLAREN, 1ST BARON (1850-1934). British coal-owner and politician. Born in Edinburgh, May 12, 1850, son of Duncan McLaren, M.P. for Edinburgh, he was a nephew of John Bright. After a brilliant career at Edinburgh University, he became a successful chancery barrister. He married in 1877 the daughter of a wealthy landowner, Henry Pochin, M.P. Having turned his attention to commerce, he became interested in collieries and ironworks, shipbuilding and railway undertakings. In 1880 McLaren entered Parliament as a Radical; in 1902 he was made a baronet, and in 1911 a baron. He died Jan. 23, 1934. His wife was an active advocate of women's suffrage and kindred movements, and his sons, Henry Duncan and Francis, were both M.P.s in the Parliament of 1910. The latter was



Lord Aberconway,
British politician

accidentally killed while flying in the Royal Flying Corps, Aug. 30, 1917. The former, born April 16, 1879, succeeded as 2nd baron. He was a Liberal M.P., 1906-1922, and became chairman of John Brown, Ltd., and other industrial concerns.

Abercorn. Settlement in Northern Rhodesia. It is about 10 m. S.E. of Lake Tanganyika on the Stevenson Road connecting that lake with Lake Nyasa. Established in 1889, it carries on a considerable trade with the neighbouring tribes. Here on Nov. 14, 1918, remnants of a German force under General von Lettow-Vorbeck surrendered to the British.

Abercorn. Mining district and settlement in Southern Rhodesia. It is connected by rly. with Salisbury, 90 m. S.W.

Abercorn, DUKE OF. Title held by the Hamilton family. It originated in 1603,

when James, eldest son of Lord Claud Hamilton, was created baron of Abercorn. In 1606 the barony became an earldom, and in 1790 a marquessate. James Hamilton



Duke of Abercorn,
succeeded 1913



Abeokuta. Native chiefs about to take their seats around the Alake, President of the Council

the temperature reaches 73° F. represents the minimum of safety. This temperature is known as the flash-point, but it does not follow that oil answering the test is safe under all conditions. The test apparatus is described in the Petroleum Act, 1879. A sample of the oil is gradually heated, until, on the application of a light, a blue flame or flash is seen above the surface of the liquid. The flash is due to the explosion of the mixture of oil vapour and air. There is also an Abel test for nitro-explosives.

Abenaki OR ABNAKI. Name given to a federation of Indian tribes who lived in the district now covered by Maine and New Brunswick. Among them were the Norridgewocks, Penobscots, and Passamaquoddies, names perpetuated in the locality. In the wars between England and France in the 18th century the Abenaki fought for the French, and in 1724 their settlement at Norridgewock was destroyed by the English and the confederacy broken up. A few of them remained in Maine and New Brunswick, where their descendants are still found; others migrated farther into Canada. See American Indians.

Abencerrages. Moorish family which settled in Spain in the 8th century. They attained to a position of influence, but in the 15th century, according to tradition, the

(1811-85) succeeded his grandfather as second marquess in 1818, and was made a duke in 1868. Groom of the stole to the Prince Consort 1846-59, he was lord-lieutenant of Ireland, June, 1866-Feb., 1868, and 1874-76. He died Oct. 31, 1885, and was succeeded by his eldest son James (1838-1913), long the chairman of the British South Africa Company, after whom townships in N. and S. Rhodesia have been named. The 3rd duke, James (b. 1869), became the first governor of Northern Ireland in Dec., 1922, and was re-appointed in 1928, 1934, and 1940, retiring in Sept., 1945.

Abercrombie, LASCELLES (1881-1938). English poet and critic. Born Jan. 9, 1881, at Ashton-upon-Mersey, and educated at Malvern and at Manchester University, he published his first book of poems in 1908. He made frequent use of the dramatic form, as in the *Sale of S. Thomas* (1911, rewritten 1931), *Deborah* (1912), and *Phoenix* (1923); but plot and characterization were subordinate to the expression of



Lascelles Abercrombie, English poet

poetic ideas in virile blank verse. His critical output includes *An Essay Towards a Theory of Art* (1923), *Principles of English Prosody* (1923), *Romanticism* (1926), and *The Principles of Literary Criticism* (1932). He was appointed lecturer in Poetry in Liverpool University in 1919, professor of English Literature at Leeds in 1922 and in the University of London (Bedford College) in 1929, and Goldsmiths' Reader in English at Oxford in 1935. He died on Oct. 27, 1938.

Abercrombie, SIR LESLIE PATRICK (b. 1879). British architect. Since 1913, when he won his first premium in an international competition for re-planning Dublin, he has held a foremost place in the British town-planning movement. In 1935 he was appointed Professor of Town Planning at University College, London. With J. H. Forshaw he prepared for the L.C.C. a plan for the reconstruction of London, and in Dec., 1944, published a further scheme for the controlled development of Greater London. He also prepared plans for the rebuilding of Plymouth and Hull. He was knighted in 1945.

Abercromby, SIR RALPH (1734-1801). British general. Son of a Scottish landowner, he abandoned law for the army in



Sir Ralph Abercromby, R.A. painting by John Hoppner, R.A. National Portrait Gallery

1756. He gained experience in the Seven Years' War and in 1793 went under the duke of York to Flanders. After distinguished service in the West Indies, he was appointed in 1797 to command the troops in Ireland. In 1799 he served under the duke of York in Holland, and in 1801 was given command of the Mediterranean expedition, landing his troops under heavy fire at Abukir Bay (*q.v.*). Wounded in the battle that followed, he died seven days later, March 28, 1801. Abercromby probably did more than any other soldier of his time to restore the discipline of the British army. After his death his wife was made a baroness; the barony became extinct in 1924. *Consult* Sir Ralph Abercromby, Lord Dunfermline, 1861; *History of the British Army*, Sir John Fortescue, 1899-1915, vol. iv.

Aberdare. Urban district and market town of Glamorganshire, Wales. It is 4 m. S.W. of Merthyr Tydfil on the railway. It has coal mines, brickfields, and breweries, and has grown enormously with the development of the local mining industry. Near by are cairns and remains of a British encampment. The electoral div. of Aberdare, returning one M.P., includes the urban dist. of Mountain Ash. Market day, Sat. Pop. 39,780.

Aberdare, HENRY AUSTIN BRUCE, 1ST BARON (1815-95). British statesman. Born at



Lord Aberdare, British statesman

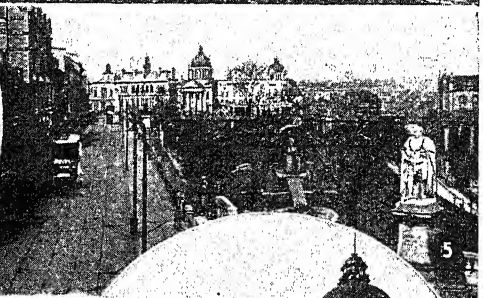
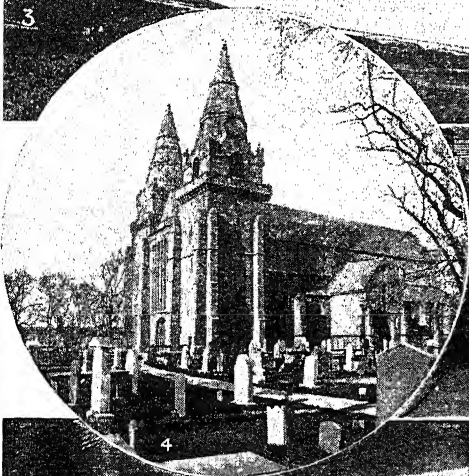
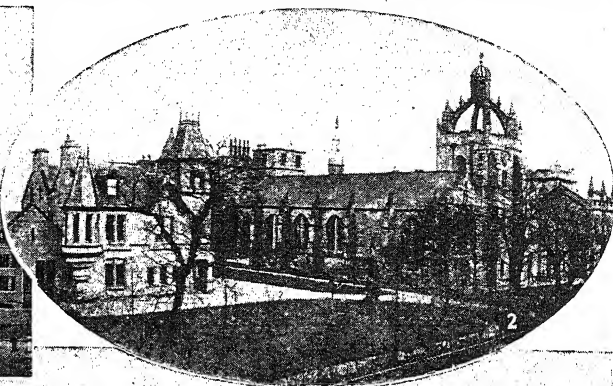
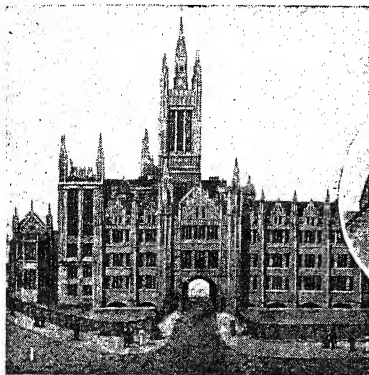
Dufryn, Aberdare, Glamorganshire, April 16, 1815, he was called to the bar in 1837, and in 1852 became Liberal M.P. for Merthyr. He was home secretary in 1868-73, when he was made lord president of the council and raised to the peerage. The Aberdare Mountains in British East Africa were named after him. He died on February 25, 1895. The 3rd baron, Clarence Napier Bruce, born Aug. 2, 1885, a well-known sportsman, succeeded to the title in 1929. He has played cricket for Middlesex, excelled at rackets, and many times represented Great Britain in real tennis, in Bathurst Cup contests.

Aberdeen. Third largest city of Scotland (1940 official estimate). It stands on a bay of the North Sea, between the mouths of the rivers Dee and Don, 130½ m. by rly. N. of Edinburgh. It is the county town of Aberdeenshire, a parl., royal and mun. bor., a county in itself, a university city, and the chief seaport of N. Scotland, and has two main rly. stations (formerly L.M.S. and L.N.E.R.).

Aberdeen formerly consisted of two contiguous towns—the episcopal burgh of Old Aberdeen, extending N. towards the Don, and the royal burgh of New Aberdeen, lying N. and W. of the Dee. These have been amalgamated since 1891. In Old Aberdeen are King's College and S. Machar Cathedral, the nave of which is now a parish church.

New Aberdeen, known as the granite city—sometimes the silver city—because of the predominance of grey granite buildings, has many imposing public edifices, notably Marischal College with a tower 260 ft. high, the municipal and county buildings, the market hall, the post office, the royal infirmary, Trinity or Trades Hall, Gordon College, the grammar school, and His Majesty's Theatre. King's College and Marischal College together form the university of Aberdeen. The city possesses an art gallery and museum, with a "hall of remembrance" attached as a memorial to men of Aberdeen who fell in the First Great War. Cowdray Hall, close by, named after its donor, Viscountess Cowdray of Dunecht, was opened in 1925.

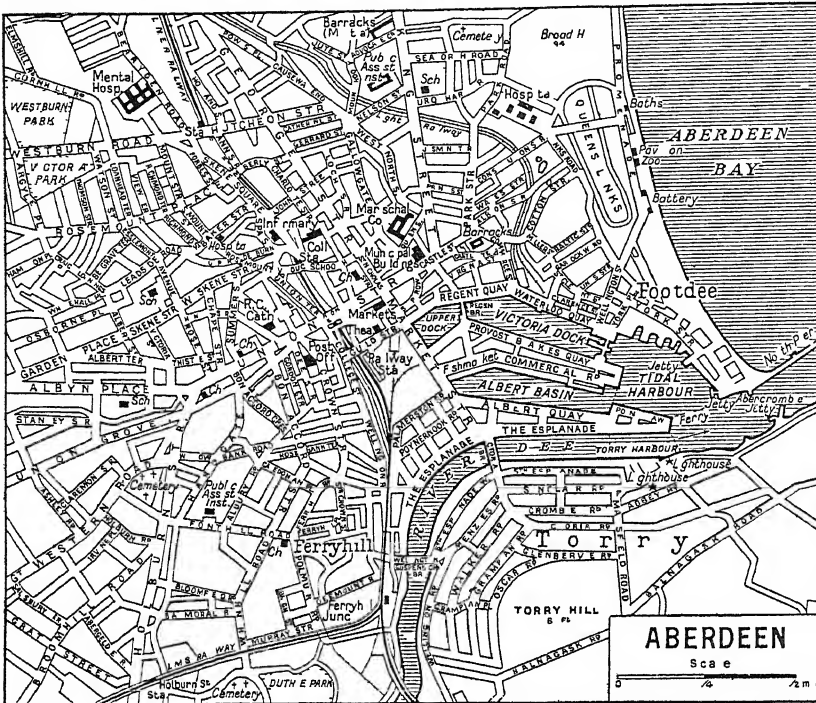
Of the city's ecclesiastical buildings, the principal are the contiguous East and West churches—formerly the church of S. Nicholas—with a spire 190 ft. high, and a peal of 36 bells—and the Roman Catholic cathedral. In Union Terrace are statues of Wallace



1. Marischal College, founded in 1593 by George Keith, Earl Marischal. 2. King's College, founded by Bishop Elphinstone in 1494 and united in 1860 with Marischal College to form the present Aberdeen University. 3. View

of the city from Balnagask. 4. Old Machar Church, or S. Machar's Cathedral. 5. Union Terrace Gardens, with statue of King Edward VII. 6. Fish Market. 7. His Majesty's Theatre and United Free South Church

ABERDEEN: VIEWS OF PLACES OF INTEREST IN THE GRANITE CITY



Aberdeen Ground plan showing the harbour, docks principal buildings and main thoroughfares

and Burns in Union Street statues of Victoria and Edward VII in front of Gordon College a statue of General Gordon and in front of the grammar school one of Byron The Mercat (market) cross dates from 1686

Besides the fisheries and fish curing establishments for which Aberdeen is noted, many other important industries flourish in the city There are shipbuilding yards, engineering, chemical granite polishing and paper works and woollen, linen, and cotton factories There is a commodious harbour, with docks covering an area of nearly 97 acres Off the S entrance is Girdleness Lighthouse Municipal undertakings include the tramway system and the water supply Aberdeen's fish market is one of the largest of the United Kingdom The BBC maintains local broadcasting studios There are golf links and several public parks Duthie Park of nearly 50 acres being the largest, and the vicinity of the fine sandy beach has been considerably developed as a pleasure resort, with esplanade and dance hall The corporation baths are among the finest in the country The Hazlehead estate (832 acres), purchased by the corporation in 1920, contains many fine walks, golf courses, and

an intricate maze, the latter a gift to the city from a former lord provost Two members are returned to parliament Pop est 189,000 (1948)

An important place in the 12th century, Aberdeen was granted a charter by William the Lion in 1179 Its people espoused the cause of Robert the Bruce, from whom it received large grants of land, and it was burned by Edward III in 1336 During the Civil War it suffered at the hands of both Royalists and Covenanters out side the city Montrose gained,



4th Earl of Aberdeen He was Prime Minister from 1852 to 1855

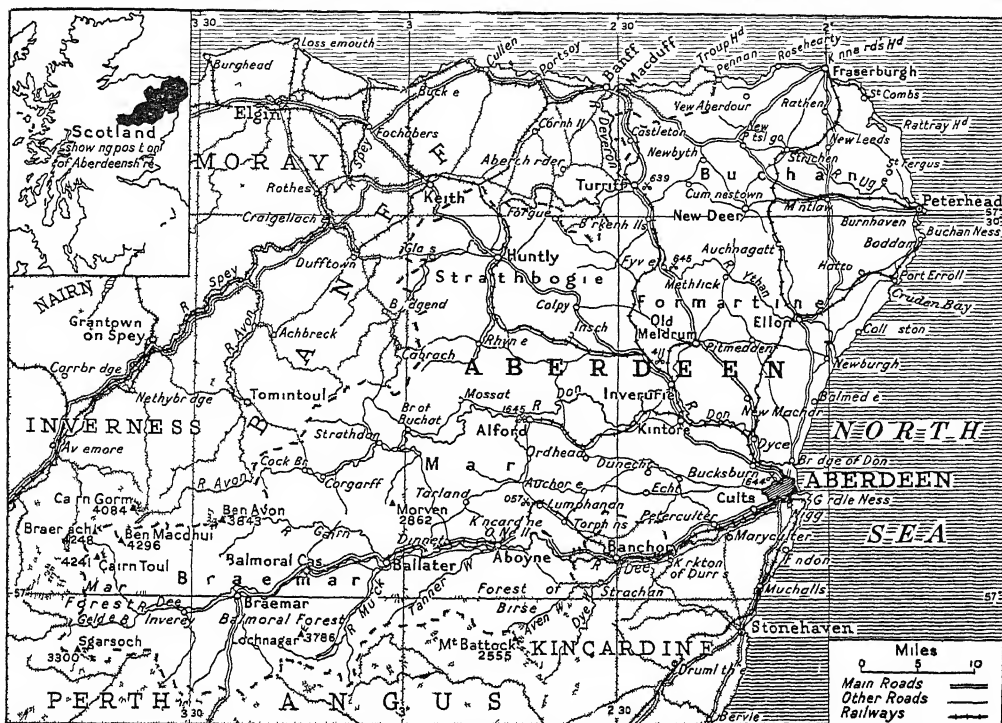
Sept 13, 1644, the second in his series of victories for Charles I, and plundering and massacre followed In 1715 the citizens elected a Jacobite town council, and in 1745 a levy of £1 000 was exacted from the town on behalf of Prince Charles Edward Stuart

The name Aberdeen should properly have been Aberdon ie mouth of the Don The Latin form is Aberdonia and the people of the city are commonly spoken of as Aberdonians

Aberdeen, GLOUCESTER GORDON, 1ST EARL OF (1637-1720) Scottish lawyer Born Oct 3 1637, second son of Sir John Gordon,

Burt, he graduated at King's College, Aberdeen, where he was a professor for four years In 1667 he succeeded to the baronetcy on the death of his elder brother He was made a judge, as Lord Haddo, in 1680, and in 1681 became president of the court of session In 1682 he was made chancellor of Scotland, and created earl of Aberdeen, but was dismissed from the chancellorship in 1684 for toleration towards Non conformists He died at Kellic, April 20, 1720 Aberdeen is supposed to be the hero of the old Scottish song, Cauld Kail in Aberdeen

Aberdeen, GEORGE HAMILTON GORDON, 4TH EARL OF (1784-1860) British statesman Born at Edinburgh Jan 28, 1784 he was educated at Harrow and St John's College, Cambridge In 1801 he succeeded his grandfather as earl of Aberdeen and in 1813 went to Vienna as ambassador, afterwards representing his country at the peace of Paris in 1814 A Tory, he became a cabinet minister under Wellington in 1828, and foreign minister from June of that year until the end of 1830 In 1834 he was for a few months secretary for war and the colonies, and was again appointed foreign minister when



Aberdeenshire With an area of nearly 2,000 square miles and a coast line of 64 miles, it is the sixth in regard to size of the counties of Scotland

Peel returned to office in 1841. He cultivated friendly relations with France at a time when serious trouble existed. He carried through smoothly the Oregon treaty of 1846, which ended a long dispute by fixing the 49th parallel of latitude as the boundary between Canada and the U.S.A., west of the Rocky Mts. He was also prominent in his efforts to avert the disruption of the Church of Scotland.

Aberdeen resigned with Peel in 1846, and after his leader's death was the recognized head of the party which had followed that statesman in his conversion to Free Trade. As such he became prime minister in Dec., 1852. The main event of his term of office was the opening of the Crimean War, into which the ministry was drawn somewhat against the will of its chief. Then came the rumours of suffering in the Crimea and of incompetence in the management of affairs at home. Clearly Aberdeen was not the man to organize the country for a vigorous war, and the passing of a vote of censure on the government was followed in Jan., 1855, by his resignation. He died Dec. 14, 1860, and was succeeded by his eldest son, George John James

Hamilton Gordon (1816-64). There are biographies of Aberdeen by his younger son Lord Stanmore, 1893, and by Lady Frances Balfour, 1923.

Aberdeen, JOHN CAMPBELL GORDON, 1ST MARQUESS OF (1847-1934). British politician. Born Aug. 3, 1847, and educated at St. Andrews and Oxford, he succeeded his brother as 7th earl in 1870. One of Gladstone's intimate friends, he was lord lieutenant of Ireland in 1886, and in 1893-98 governor general of Canada. In 1905 he was lord lieutenant of Ireland, a post he retained until 1915, when on his retirement he was made marquess of Aberdeen and Temair. He had been a

the 1st Lord Tweedmouth whom he married in 1877, was prominent in political and philanthropic circles. She died April 18, 1939. In 1926 a volume of reminiscences by Lord Aberdeen and his wife was published, entitled *We Twa*, followed in 1929 by *More Cracks with We Twa*. Lord Haddo, eldest son of the 1st marquess, succeeded on his father's death. He was born Jan. 20, 1879. Haddo House, Aberdeenshire, is the family seat.

Aberdeenshire. NE maritime co. of Scotland. Bounded N and E by the North Sea, W by Banff and Inverness, and S by Perth, Angus, and Kincardine, it is popularly apportioned into the districts of Braemar, Mar, Strathbogie, Garioch, Formartine, and Buchan. It has an extreme length from NE to SW of 84 m., a greatest breadth of 46 m., and an area of 1,971 sq. m., and is the sixth largest of the Scottish shires.

The coast, 64 m. in extent, is bold and rocky, but almost free from indentations. The chief promontories are Buchan Ness, the most easterly extremity of Scotland, Kinnaird's Head and Rattray Head. The surface is generally hilly, and becomes extremely mountainous in the SW where the Grampians throw out the



Ishbel Maria,
Lady Aberdeen

1st Marquess
of Aberdeen

privy councillor since 1886. He died March 7, 1934. Lady Aberdeen (1857-1939), a daughter of

Cairngorm group, the loftiest summits being Ben Macdhui, 4,296 ft., the second highest peak in Great Britain; Braeriach, 4,248 ft., and Cairntoul, 4,241 ft. Granite and gneiss are the prevailing rocks, the former being largely quarried for building purposes; sandstone is also worked. The largest rivers are the Dee, 87 m.; Don, 82 m.; Deveron, 61 m.; and Ythan, 36 m., all plentifully stocked with salmon and trout, the Ythan and Don also yielding pearl-mussels. Smaller rivers include the Ugie, 21 m.; Bogie, 14 m.; and Cruden, 11 m. Of the few lakes, Loch Muick, 2½ m. long, is the largest.

The surface of the hilly districts is mainly moorland, but in the N.E. and between the Don and Ythan the soil has been made fertile by highly skilful tillage, and is admirably suited for agriculture, oats and barley being the chief crops cultivated. Next in importance to agriculture is the fishing industry, while as stock rearing and feeding country Aberdeen excels. Large numbers of cattle are fattened for home consumption and export, and sheep, pigs, and horses are extensively reared. Of the other industries, several are associated with the quarrying of granite, while fish-curing and the manufacture of woollens, cottons, sailcloth, and paper are actively carried on. The principal towns are Aberdeen, the co. town; Peterhead, the centre of the fisheries; Fraserburgh, Huntly, and Inverurie. East and West Aberdeenshire each send one member to Parliament, and two are returned for Aberdeen city. Balmoral Castle is in the S.W. part of the county. Pop. est. 334,700.

LITERARY ASSOCIATIONS. Lord Byron was taken to Aberdeen in 1790, at the age of two, by his mother, a Gordon, of Gight in Aberdeenshire. Mother and son lived in Broad Street, Aberdeen, till Byron's 11th year during which period the boy attended the city grammar school. A favourite walk was that to the Brig o' Balgownie in Old Aberdeen, from which he used to gaze into the dark waters of the Don beneath. Many of the future poet's holidays were spent in the neighbourhood of Ballater on Deeside, under the shadow of Lochnagar.

Among men of letters associated with the university are James Beattie (1735-1803), philosopher and poet, author of *The Minstrel*, educated at Marischal College; and Smollett, the novelist, M.D. of the same college. A rich treasure-house

of the Aberdeenshire dialect is to be found in Johnny Gibb o' Gusket Neuk, a novel by William Alexander (1826-94). Another Aberdeenshire novelist was George MacDonald (1824-1905). In his *David Elginbrod*, Alec Forbes of Howglen, and Robert Falconer are faithful scenes of the life and manners of this county. A notable volume of poems in the dialect is *Hamewith*, by Charles Murray, 1909.

Aberdeen Terrier. Popular name for the Scotch Terrier (*q.v.*).

Aberdeen University. Consists of King's College and Marischal College and received its present form in 1860. In reality it goes back to 1494, when King's College was founded. Marischal College was founded by George Keith, Earl Marischal, in 1593. The two colleges were independent universities until 1860, and both had the right of conferring degrees. King's College, in Old Aberdeen, possesses a chapel and other 16th century remains. The present Marischal College is a modern building, dating only from 1836. The university has five faculties; arts and divinity are taught at King's College, and science, law, and medicine at Marischal College. It admits women to its degrees, and unites with the other Scottish universities in electing three members to Parliament.

Aberdour. Parish and village of Fife, Scotland. On the Firth of Forth, 18 m. by rly. N.W. of Edinburgh, it is resorted to for sea-bathing, and has a good tidal harbour. Here are the ruins of Aberdour Castle, a seat of the earls of Morton. Pop. 2,055.

Aberdovey. Village and watering place of Merionethshire, Wales. It stands at the mouth of the Dovey, 4 m. S. of Towyn, on the railway. Slate, lead, and copper are worked near by, and visitors are attracted by the quiet of the place and the beauty of its surroundings. Pop. 1,253.

Aberfeldy. Police burgh of Perthshire, Scotland. It stands near the S. bank of the Tay, 32½ m. N.W. of Perth, on the railway. The Falls of Moness, 1 m. distant, are mentioned in Burns's *Birks of Aberfeldy*. The Black Watch was embodied near here in 1740. Market day, Thurs. Pop. 1,505.

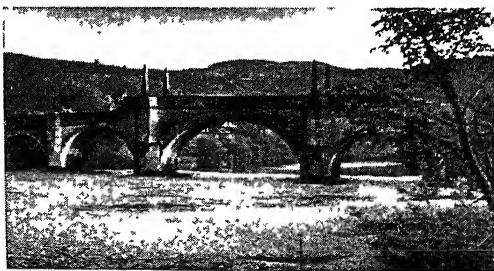
Aberfoyle. Parish and village of Perthshire, Scotland. On the Laggan, a head-stream of the Forth, it is 35 m. N.N.W. of Glasgow by the railway, and on one of the routes to the Trossachs. Its scenery is described by Scott in *Rob Roy*. Pop. 1,014.

Abergavenny (Rom. *Goban-nium*). Municipal borough and market town of Monmouthshire.

England. It lies on the river Usk, where the Gaveny joins it, is 23 m. S. of Hereford, and is well served by rlys. It has an old grammar school, the remains of the castle of the Nevilles, and a parish church that was formerly a Benedictine priory. The town suffered severely during the border fighting of the 12th and 13th centuries, being burnt by Owen Glendower (*q.v.*) in 1404. Market days, Tues. and Fri. Pop. 8,608.

Abergavenny, MARQUESS OF. British title borne by the Neville (or Nevill) family. In 1392, Edward Neville, son of the earl of Westmorland, having inherited the estate of Abergavenny, became a baron, and the title was retained by his descendants. In 1784, Baron Bergavenny or Abergavenny was made an earl, and in 1876 the fifth earl was made a marquess. The 4th marquess, G-ly Temple Montacute Larnach-Nevill, born July 15, 1883, succeeded his uncle in 1933. The principal seat of the family is Eridge Castle, Sussex, and the heir to the title is known as the earl of Lewes. *Pron.* Abergenny.

Abergele. Watering place and market town of Denbighshire, Wales. It is situated near the coast between Rhyl and Colwyn Bay, 34 m. N.W. of Chester, on the rly., and with the coastal region of Pensarn forms an urban district. The church contains 15th century glass. Market day, Mon. Pop. 2,651.



Aberfeldy Bridge, built over the Tay in 1733 by General Wade, who held command in the Highlands

Aberglaslyn, PASS OF. One of the beauty spots of N. Wales, it is $1\frac{1}{2}$ m. from Beddgelert, the river Glaslyn flowing between rocky walls that rise steeply to 700 ft. on either side. The river here forms the boundary between Carnarvonshire and Merionethshire.

Abernethy. Police burgh of Perthshire, Scotland, on the estuary of the Tay, 9 m. S.E. of Perth by railway. It has one of the only two ancient round towers in Scotland. Abernethy biscuits were originally manufactured here. Pop. 1,154.

Abernethy, JOHN (1764–1831). British surgeon. Born in London, April 3, 1764, he was educated at Wolverhampton Grammar School. After serving as assistant surgeon and lecturer at St. Bartholomew's Hospital, of which he was surgeon in 1815–29, he was made professor of anatomy and surgery at the College of Surgeons in 1814. Abernethy first enunciated the principle that local diseases are symptomatic, and that most of them arise from disordered digestive organs. Popular and eccentric in manner, he was an excellent medical teacher. He died at Enfield, April 28, 1831.



John Abernethy,
British surgeon
Sir T. Lawrence, P.R.A.

Aberration (Lat. *ab*, from *errare*, to wander). Optical phenomenon of two kinds, spherical and chromatic. Spherical aberration may be defined as follows: When a luminous object is placed opposite a small, spherical, concave mirror, the rays of light falling on the mirror are all reflected back so as to pass through one point on the axis of the mirror. But if the mirror is large the reflected rays no longer pass through a single point, those which arrive from points of the mirror farther from its axis cutting the axis nearer the surface of the mirror and farther away from the luminous source of light.

It is found that all the reflected rays are tangential to a curve which forms two cusps inside the curve of the mirror. This caustic curve, as it is called, can be clearly seen when a bright light shines on the inside of a cup nearly filled with milk, the surface of the milk acting as a screen to intercept the reflected rays from the cup's inner surface. Spherical aberration

of light images from the surface of a concave mirror is the simplest theoretical instance of the aberration which takes place when light passes through lenses compounded of concave and convex surfaces.

Chromatic aberration in lenses is an illustration of a different principle. White light in passing through a prism, that is to say in passing through the medium of the atmosphere into the medium of glass, is bent or deviated at the surface of the glass. It is also dispersed on its emergence from the prism into the band of rainbow colours which are the constituents of white light. When white light, i.e. light of mixed colours and therefore of mixed wave lengths, passes through lenses these laws come into operation. But the amount of dispersion sustained by the different colour constituents of the white light is not the same, and it differs with the character of the glass. Consequently, when light, by which is meant mixed light or light of differing colours and wave lengths, passes through a system of lenses, the image of the source of light is projected in different colours and in different places and in the different aberrations. If all these images are intercepted by a plane surface, such as the retina of the eye or the focusing screen of a camera, they arrive in confusion. This is

chromatic aberration. One effect is the image seen on a dark background which has a rainbow-coloured fringe.

In astronomy, aberration is the displacement of a star, arising from the progressive motion of light combined with the orbital movement of the earth. It provided the basis for determining the speed of light. See *Achromatic Lens*; *Astronomy*; *Light*.

Abersychan. Urban district and village of Monmouthshire, England. It is 10 m. N.N.W. of Newport, is well served by railways, and has a large industrial population engaged in the neighbouring coal mines and tinplate and iron works. Market day, Sat. Pop. 12,321.

Abertillery. Urban district and town of Monmouthshire, England. It is 16 m. N.W. of Newport by railway. It owes its growth to the development of

the adjacent coal mines, and has iron and tinplate works. It gives its name to a division which returns one member to Parliament. Market day, Sat. Pop. 22,281.

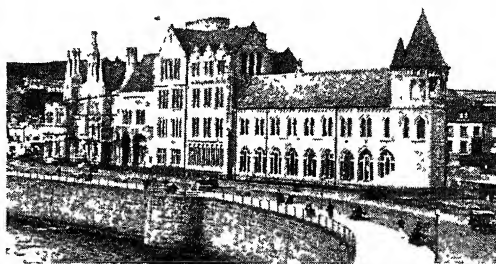
Aberystwyth. Mun. borough, market town, seaport and watering place of Cardiganshire, Wales.



Aberystwyth arms

It stands at the junction of the rivers Ystwyth and Rheidol, on Cardigan Bay, 249 m. W.N.W. from London by the railway, though only just over 210 m. by road. It has a pier originally built in 1864, and a promenade extending from Constitution Hill in the N., round Castle Point, to the harbour.

Among a number of public buildings are University College, attached to the University of Wales, and the National Library of Wales, founded in 1907. The college, which embraces many styles of architecture, has a frontage of over 400 ft., and was opened in 1872. The 12th century castle is said to have been built by Gilbert Strongbow, and was used by Charles I as a mint. It was dismantled in 1647, and only a few ruins remain. There are no industries, and the town depends



Aberystwyth. Façade of University College

principally on the revenue obtained from holiday visitors, who are attracted by its fine beach, boating and fishing facilities, and beautiful surroundings. Governed under a charter granted by Henry IV, it was one of the Cardigan parliamentary boroughs till 1885. Market day, Mon. Pop. 9,476.

Abetz, OTTO. Nazi agent, employed as Hitler's "ambassador" in occupied Paris from Aug. 5, 1940, until the abolition of the post in 1942. He remained in liaison with the Vichy govt. until 1944. Tried in 1949 in Paris for war crimes, he received 20 years' imprisonment.

AbeYance (Fr. *à* and *bayer*, to gape at, hanker after). Legal term used when there is uncertainty as to whom rights and titles belong. Typical cases are claims to peerages, the ownership of manorial rights, and the right of presentation to livings. Rights of action are in abeyance until the action is begun or abandoned. In some cases there is a statutory limitation as to the period within which the action must be brought. Proceedings under Lord Campbell's Act (Fatal Accidents Act) must be brought within twelve months and actions for slander within six years. Actions against public authorities, such as county councils, in respect of negligence on the part of any of their servants, or for any official act, must be brought within twelve months.

The word is, however, most commonly used in connexion with peerages. Certain peerages, the old baronies by writ, for instance, pass to heirs general. This means that when there is no male heir they pass to a daughter, but if there is more than one daughter they go into abeyance, because the daughters are all equally co-heirs. The abeyance may be terminated in two ways. Sometimes the co-heirs and their descendants die off until only one is left, who can then claim the peerage. The other way is for the crown to select one of the co-heirs and to call the peerage out of abeyance in favour of her or one of her descendants. Certain restrictions on the power of the crown to call peerages out of abeyance were recognized in 1927. *Consult* Report on Peerages in Abeyance, 1927.

Abgar. Name or official title of 28 rulers of Edessa, in Mesopotamia, 136 B.C.—A.D. 217. Discredited tradition states that Abgar XIV sent a letter to Jesus Christ asking Him to visit him and heal a disease from which he was suffering. This letter, with the reply of Christ, is quoted by Eusebius of Caesarea, who states that Christ promised to send a disciple to Edessa after His ascension.

Abhorrrers. Name given to persons who, in 1679–80, abhorred the agitation for persuading Charles II to call a Parliament. This, it was thought, would pass the bill excluding James, duke of York, afterwards James II, from the throne. Those who devised the Parliament for that purpose were called Petitioners; their leader was the earl of Shaftesbury, and their protégé the duke of

Monmouth. The names originated at the time when public opinion was excited against James and the Roman Catholics. In a sense the Petitioners and Abhorrrers were ancestors of the Whigs and Tories of a later day—the Whigs being the Petitioners and the Tories, or upholders of hereditary right, the Abhorrrers.

Abiathar. Jewish high priest. Son of Ahimelech, who was killed by order of Saul for assisting David, he escaped his father's fate (1 Sam. 22) and became a firm friend to David. In Solomon's time he followed Adonijah in revolting, and was deprived of his office (1 Kings 1 and 2).

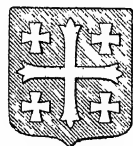
Abib. First month of the sacred and 7th month of the civil year of the Jews, corresponding to part of the Christian March–April. Later known as Nisan, it is so called in post-exilic writings. The Passover feast begins on the 15th.

Abigail. Wife of Nabal, a rich boor who refused food to David when he was in the wilderness of Paran. She persuaded David not to punish her husband, and so gained his affection that he married her after the death of Nabal (1 Sam. 25). She proved a faithful and devoted wife, and was the mother of Chilcab (2 Sam. 3), or Daniel (1 Chron. 3). Abigail as a name for a waiting-maid is derived from Abigail's description of herself as David's handmaid. Another Abigail was David's sister and mother of Amasa (2 Sam. 17 and 1 Chron. 2).

Abijah OR **ABIJAM.** Name of several persons mentioned in the O.T. They include a daughter of Zechariah (2 Chron. 29); a son of Rehoboam, (1 Kings 15 and 2 Chron. 13); the second son of Samuel (1 Sam. 8); a son of Jeroboam I, who died in childhood (1 Kings 14); and one of the descendants of Eleazar, after whom was named the eighth of the 24 courses of priests at the Temple. To this John the Baptist's father belonged (1 Chron. 24).

Abimelech. Hebrew name meaning My father is the king, and possibly a royal title. It occurs in the O.T. in connexion with the Philistine king of Gerar (Gen. 20, 21, and 26); and with the son of Gideon, or Jerubbaal, by a woman of Shechemite nationality (Judges 8 and 9), who made himself king by murdering all his brothers except Jotham, who escaped. He was killed at his own request by his armour-bearer, after being fatally wounded by a woman at the siege of Thebez.

Abingdon. Municipal borough and ancient market town of Berkshire England. It is on the Thames, 6 m. S. of Oxford by the railway, and has clothing and carpet factories and a large agricultural trade. Later-established industries include a large motor and engineering works, and at the



Abingdon arms

R.A.F. station here bomber crews and airborne forces were trained during the Second Great War. The grammar school, founded 1563, was rebuilt in 1870;

other antiquities include the remains of a 7th century abbey, which was rebuilt in 955 and became one of the richest in the kingdom, a 15th century bridge, and a 17th century town hall. Abingdon was a prominent town in the 8th century. A parl. borough down to 1885, it now gives its name to a county division which returns one M.P. Pop. 7,240.

Abingdon, EARL OF. English title borne since 1682 by the family of Bertie. It was first held by Francis Norris, Lord Norris, or Norreys, a son of Sir Henry Norris, the diplomatist. He was made an earl in 1620, but died without sons in the same year, when his titles became extinct. His only daughter married Montague Bertie, 2nd earl of Lindsey, and their son James was made earl of Abingdon in 1682. An elder half-brother succeeded to the earldom of Lindsey. From James the later earls are descended. The 8th earl (b. 1887), who succeeded his grandfather in 1928, became also 13th earl of Lindsey in 1938. The eldest son is known as Lord Norreys.

Abingdon, WILLIAM LEPPER PILGRIM (1859–1918). British actor. Born at Towcester, he made his first appearance on the stage at Belfast in 1881, and in London five years later. He won distinction as the villain of many melodramas, chiefly at the Adelphi. From 1906 until his death, May 19, 1918, he lived mainly in America.

Abinger, JAMES SCARLETT, 1ST BARON (1769–1844). British judge. Born in Jamaica, he was educated at Cambridge. Successful as a barrister, he was from 1834 until his death, April 7, 1844,



Lord Abinger,
1st Baron
Sir M. A. Shee, P.R.A.

chief baron of the Exchequer. Scarlett was M.P., first as a Whig and then as a Tory, 1819-35, and at one time attorney-general. In 1835 he was made a peer, the title being still held by his descendants. Abinger's second son was Sir J. Y. Scarlett (1799-1871), the cavalry leader at Balaclava. See Memoir, P. C. Scarlett, 1877.

Abinger. Village of Surrey, 8 m. S.E. of Guildford. Its features are a church with a Norman nave (seriously damaged by enemy action, 1944), a British burial mound, and the stocks on the green. Abinger Hammer, with a clock portraying a smith striking the hours, is the site of a vanished iron industry. The magnetic station of the Royal Observatory was moved in 1924 to Abinger. In the neighbourhood are Crossways Farm, claimed to be the place described in Meredith's *Diana* of the Crossways, and the picturesque hamlet of Friday Street, a popular rendezvous for walkers.

Abington, FRANCES (1731-1815). English actress. Daughter of a private in the Guards, her maiden name was Frances Barton. She was first a flower-seller, then a street singer and reciter at taverns and later servant to a French milliner in Cockspur Street, London. She made her stage debut at the Haymarket as Miranda in Mrs. Centlivre's comedy, *The Busybody*, Aug. 21, 1755, and in 1759 married her music master, Mr. Abington. After five years in Dublin, she was invited by



Mrs. Abington, English actress
Painting by Sir Joshua Reynolds, P. R. A.

David Garrick to Drury Lane, where she remained for 18 years, playing the great ladies of comedy, Shakespearean heroines, romps, and even chambermaids, and creating the part of Lady Teazle in the original production of *The School for Scandal* in 1777. In 1782 she went to Covent Garden, and during 1790-7 was absent from the

stage, on which she made her last appearance, as *Lady Racket* in *Three Weeks after Marriage*, April 12, 1799. She died March 4, 1815.

Abiogenesis (Gr. *a*, not; *bios*, life; *genesis* origin). One theory of the origin of life. The term,

power to many industrial mining concerns. The pulp and paper industry has been greatly developed from the natural resources of the region. Its centre is at Iroquois Falls. Abitibi also includes two lakes, one 60 m. long,



Abinger Hammer. The name of this picturesque Surrey village is a reminder of the iron industry which once flourished here

first used by Huxley in 1870, is opposed to biogenesis. According to it, living matter may take its origin from non-living matter; in other words, there is such a thing as the spontaneous generation of life. See *Biology*; *Life*.

Abipones. South American Indian tribe formerly inhabiting N. Argentina. They are known mainly from the sojourn among them of an 18th-century Jesuit, Dobrizhoffer. They practised tattooing, lip-piercing, ear-piercing, and boy infanticide. Allied in speech to the Guaycurus, they have been absorbed or extinguished by the Toba tribe (*q.v.*).

Abishai. Son of Zeruiah and nephew of King David. A man of remarkable courage, he went with David into the camp of Saul (1 Sam. 26), whom he wished to kill, and fought against Edom in the Valley of Salt (1 Chron. 18). One of the three who risked their lives by entering the Philistine lines to get water for David from the well at Beth-lehem (2 Sam. 23), he also saved the king's life by killing the Philistine giant, Ishbi-benob (2 Sam. 21).

Abitibi. Region of N. Ontario, Canada, through which flows the 200-m. river of the same name, a tributary of the Moose. The Ontario govt. rly. runs parallel to the river for 150 m. There are several hydro-electric power plants within the region, supplying

and a govt. game reserve. Abitibi county, in the province of Quebec, has been an agricultural settlement area since 1912.

Abjuration (Lat. *ab*, from; *jurare*, to swear). In general, renunciation of any kind, more particularly renunciation of an oath of allegiance to a sovereign or creed. In England the word was used of criminals and others who swore to leave the country. The oath of abjuration was an oath imposed by an Act of 1701 on all M.P.s and officials; by it they abjured all allegiance to the Jacobite cause, and promised to maintain the succession to the throne as fixed by the Bill of Rights and the Act of Settlement.

Ablaincourt. Village of France, in the department of Somme. About 8 m. S.W. of Péronne, S. of the river Somme, it figured prominently in the first battle of the Somme (*q.v.*). It was captured by the French Nov. 7, 1916, retaken by the Germans in the spring of 1918, and finally regained by the Allies in Aug., 1918.

Ablain St. Nazaire. Village of France, in the department of Pas-de-Calais, N. of Arras. Severe fighting occurred here in May, 1915. Carried by the French, it remained in their hands throughout the remainder of the war.

Ablainzeville. Village of France in the department of Pas-de-Calais, midway between Albert

and Arras. The Germans gained a footing here in their offensive of March, 1918. For a time heavy assaults were beaten off by the Allies, and much fighting occurred before it was finally taken by the Germans. On Aug. 21, 1918, it was recaptured together with Bucquoy, Courcelles and other places.

Ablative. Grammatical term. It is a case, in the original Indo-European language, used to signify motion from, origin, comparison or the agent. It has survived in Sanskrit and Latin; in Greek its place is supplied by the genitive, in other languages by prepositions. The Latin name is *ablativus casus*, the case connected with taking away.

Ablett, Thomas Robert (1849-1945). British art teacher. Dissatisfied with the official system of art training in schools, he founded in 1885 the Royal Drawing Society, whose examinations are now taken by about 40,000 children each year. His system, based on "snapshot" memory drawing, aimed at developing powers of observation. He died June 5, 1945, aged 96.

Ablution (Lat. *abluerere*, to wash away). Liturgical term for ceremonial washing in religious services, usually as a symbol of the purification of the soul. The law of Moses gives many directions for these washings; and similar practices are general among Mahomedans and Hindus. The term is applied to the cleansing of the sacred vessels after Holy Communion.

Abner. Captain of King Saul's army. After the death of Saul, he supported Ish-bosheth, and then joined David. He was treacherously killed by Joab, and David wrote an elegy to his memory (1 Sam. 14; 2 Sam. 2 and 3). Abner is the name of a character in Racine's tragedy *Athalie*.

Abney, Sir William de Wivelslie (1844-1920). British chemist and physicist. Born at Derby, he was educated at Rossall and the R.M.A. He received a commission in the R.E. in 1861, and was promoted captain in 1873, being at that time instructor in chemistry to the R.E., Chatham.



Sir William Abney,
British chemist
Russell

In 1900, he became adviser in science to the Board of Education. His work became chiefly connected with photography and spectrum analysis, and he contributed

largely to the progress made in colour photography and colour printing. He died Dec. 3, 1920.

Abney Park. District in N. London. It is in the metropolitan borough of Stoke Newington, and has a large cemetery, dedicated May, 1840, and notable for its ancient trees and arboretum. The district is named after Sir Thomas Abney (1640-1722), a London merchant.

Abo, or TURKU. Seaport of Finland, capital of the prov. of Abo-Björneborg, and the former capital of the country. It is on the river Aurajoki, near its mouth on the Baltic Sea, and is 168 m. by rly. from Helsinki. It exports timber, hides, fruit, and eggs, and has shipbuilding yards, is the seat of an archbishop, has a fine cathedral, and its old castle contains a museum. The university formerly at Abo was removed to Helsinki after a fire in 1827. Peace was concluded at Abo between Russia and Sweden in 1743. The town was bombed in the Russo-Finnish war of 1939-40. Pop. 74,351.

Abo, EBOE or IBO. Town of Nigeria. It stands at the head of the Niger delta, and its chief trade is in palm oil.

Abo-Björneborg, or TURKU-PORI. Government or province in S.W. Finland. On the Gulfs of Bothnia and Finland, it has an area of 8,496 sq. m., many lakes, but no important rivers. Abo, the capital, Björneborg and Raumo are the chief towns. Agriculture, cattle-rearing, fishing, and mining are the principal industries, and brewing, distilling, and the manufacture of metal and wooden wares, leather, paper, and tobacco are also carried on. Pop. 522,222.

Abolition Act, or EMANCIPATION ACT. Popular term for the Act for the Abolition of Slavery throughout the British Colonies, passed by the British Parliament on Aug. 7, 1833. It declared slavery to be unlawful "utterly and for ever" on and after Aug. 1, 1834, and allowed a sum of £20,000,000 in compensation to slave owners. An earlier measure abolishing the slave trade had been passed in 1807. See Anti-Slavery Movement; Slave Trade.

Abomey, or AGBOMEY. Capital of the former kingdom of Dahomé, West Africa, now one of the chief centres in the French colony of that name. Situated 63 m. N. of Whydah, W. of the main line rly., it trades in palm oil, ivory, and gold. The French occupied the town in 1892. Pop. 20,000.

Abony. Town and district in Pest-Pilis-Solt-Kiskum county, Hungary. It is 11 miles E. of Czegléd on the rly. between that town and Szolnok, and is a farming centre on the Alföld (*q.v.*). The inhabitants are mostly Magyars; one-sixth are Calvinists, the rest Roman Catholics. Pop. 14,729.

Aborigines (Lat. *ab origine*, from the beginning). Name applied by classical writers to primitive tribes in Italy, perhaps because their ancestors were deemed to have been its earliest inhabitants, sprung from the soil like the Greek autochthones. Modern research establishes the conclusion that they formed part of the neolithic, shortish, brunette, long-headed Mediterranean stock which practised hunting and agriculture on the Italian plains, and were ultimately driven into the Apennine uplands by round-headed Alpine immigrants from the north. Allied to, if not coincident with, the Ligurian race, they probably gave early Rome its Latin dialect and its plebeian population.

The term is now generally used for the peoples found in distant lands by their first European discoverers. The preferable form in the singular is *aboriginal*; this, with its plural, is increasingly used in Australia, the word native being applied to Australian-born whites. In India the most aboriginal tribes are the Andamanese and the pre-Aryan peoples who speak the Austroasian—Munda and Mon-Khmer—languages; the Dravidian-speaking peoples are also ranked as aborigines.

After the Act for the abolition of slavery throughout the British colonies was passed in 1833, reports upon the condition of the aborigines were presented to Parliament in 1834 and 1837. An Aborigines Protection Society was founded in 1837, and a British and Foreign Anti-Slavery Society in 1839. Amalgamated as the Anti-Slavery and Aborigines Protection Society in 1909, it aims at protecting and advancing the interests of enslaved and oppressed native races. Down to the outbreak of the Great War the amalgamated society was concerned with the exposure of the Putumayo atrocities, the amelioration of the labour system in Portuguese West Africa, the abolition of the native system of domestic servitude in Nigeria, the reform of the methods of recruiting native labour in the New Hebrides, and the safeguarding of coolie labour in general.

The protection of aborigines is a matter of constant administrative concern throughout the British

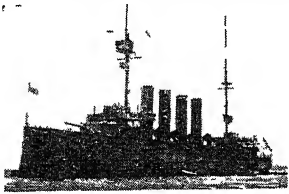
Empire. In Canada, as in the U.S.A., there is a department of Indian affairs; in the Union of South Africa a department of native affairs. Queensland and West Australia appoint a chief protector of aborigines, Papua a commissioner for native affairs, New Zealand a minister representing the native race. There are secretaries for native affairs in Fiji, Gold Coast, and Hong Kong, besides protectors of labour or immigration in some of these and in other parts of over-sea Britain.

Bibliography. Races of man, J. Deniker, 1900; Races and Peoples, D. G. Brinton, 1901; Relations of the Advanced and Backward Races of Mankind, J. Bryce, 1902; Native Races and Their Rulers, C. L. Temple, 1918.

Abors. Primitive Mongoloid tribes inhabiting the Abor hills in the Assam borderlands. They were subdued by a British punitive expedition, 1911-12.

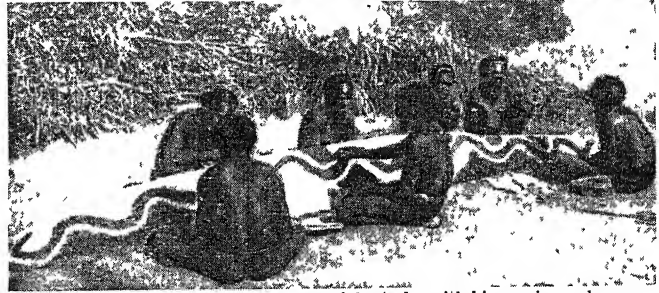
Abortion (Lat. *ab*, from; *oriri*, to arise). Term used in two restricted senses. To physicians it means expulsion of the contents of the uterus or womb, before the child is possibly capable of surviving—that is, at least before the end of the sixth month of pregnancy, and has therefore the same meaning as miscarriage. In law, however, abortion means the artificial expulsion of the uterine contents at any period of pregnancy.

Abortion, in the medical sense, is very common, having been estimated at as much as one-sixth of all deliveries. The most frequent causes are disease or malformation of the mother or infant, acute illness, accident, poisoning—particularly lead poisoning—and shock, grief, or other violent emotion.



H.M.S. Aboukir, sunk by German submarine U9, September 22, 1914

Artificial attempts to procure the condition may be followed by the gravest consequences. In law the essence of the offence is the *intention* to procure abortion, and it is an offence to supply any instrument or drug for the purpose, even though the woman does not use it and is not even pregnant. If a woman dies as the result of criminal abortion, the person responsible may be held guilty of murder.



Aborigines. Top left, a medicine man of Australia with his magic markings; right, Warramungas seeking in the tree grave of a kinsman, lately dead, for traces of the totem of his "killer." Below, natives whose totem is a serpent, building a totem mound to placate their benefactor
From Spencer & Gillen, "Across Australia," Macmillan & Co Ltd.

In a more generalised biological sense abortion occurs when any structure or organ, such as a bud, loses all capacity for further development soon after it has been initiated.

Aboukir, H.M.S. Name in the British Navy, first given to the French 74-gun ship Aquilon, taken at the Battle of the Nile, in 1798. Ships-of-the-line of the same name, of 74 and 90 guns, were launched in 1807 and 1848 respectively, while the fourth Aboukir, belonging to the oldest batch of armoured cruisers in the Navy at the outbreak of the 1914-18 War, was laid down at the Fairfield Yard, Govan, in 1898, and completed in 1902. She had a 12,000-ton displacement, was 440 ft. long and 69 ft. in beam, speed being 21 knots with engines of 21,000 h.p. On Sept. 22, 1914, under the command of Capt. J. E. Drummond, and in company with the Hogue and Cressy, she was torpedoed by the German submarine U9, and sunk, with a loss of 25 officers and 502 men. The Hogue and Cressy were also sunk, the total loss of life being 62 officers and 1,397 men.

About, EDMOND FRANÇOIS VALENTIN (1828-85). French writer. Born at Dieuze, Meurthe,

Feb. 14, 1828, About was educated in Paris, and in 1851 attended the French School at Athens. His stay there inspired his Contemporary Greece, 1854. Tolla, a Tale of Modern Rome, 1854, was widely discussed, and increased About's fame. Other novels from his pen are The King of the Mountains, 1856; Germaine, 1857; Trente et Quarante, 1858; Madelon, 1863; The Man with the Broken Ear, 1861; and The Romance of an Honest Man, 1880. His plays, Guillery, produced at the Théâtre Français, and Gaetana, at the Odéon, were unsuccessful. About's attack on the temporal



Edmond About, French writer

power of the Pope and his anti-clericalism brought him enemies, but he never shrank from controversy, and his book on Alsace, 1872, involved him in trouble

Edmond About

with the Germans, who imprisoned him for a week. In 1872 he was appointed editor of *Le XIXe Siècle*. Elected a member of the French Academy in 1884, he died, Jan. 17, 1885, before installation. About was a gifted journalist; his clear and forcible style has been compared to that of Voltaire, and his talents are seen at their best in his novels. *Pron.* Aboo.

Aboyne, OR CHARLESTON OF ABOYNE. Village and parish, Aboyne and Glentanner, of Aberdeenshire, Scotland. On the Dee, it is 10 m. E. of Ballater, on the railway. Near is Aboyne Castle, the seat of the marquess of Huntly. Pop. of parish, 1,525.

Abra. River in Luzon, Philippine Islands. Rising in the Caballeros range, it empties into the China Sea, and is navigable by small craft for a considerable distance. A prov. of Luzon, rich in minerals, is named after it.

Abacadabra. Magical word or formula derived from Gnostic worship. The first known reference to it is in a work by Serenus Sammonicus, a follower of Basil-

ides of Alexandria, in the 2nd century A.D. It was supposed to conceal the name of God. Usually written on parchment in the form

of an inverted cone, and folded in the shape of a cross, it was worn round the neck as a talisman against sickness or danger. Sometimes, after being worn for nine days, it was thrown over the shoulder into an eastward-flowing stream. *See* Abraxas.

Abraham, PLAINS OF. Heights, close to the city of Quebec, Canada, and on the N. bank of the St. Lawrence river, where Wolfe defeated the French under Montcalm, Sept. 13, 1759. They were named after a pilot called Maitre Abraham. The Plains, on which stands a monument to Wolfe and Montcalm, were dedicated to the public as a park and playground in 1908. *See* Quebec, Capture of.

Abraham OR ABRAHAM. Founder of the Jewish or Hebrew nation. The story of his life, as given in Gen. 11-25, has been the subject of much critical inquiry. Son of Terah, descendant of Shem, and a native of Ur of the Chaldees, possibly Mugheir, in S. Babylonia, his period is conjecturally about 2300 B.C. With his father, his wife Sarai, or Sarah, as her name is spelt in the later part of the narrative, and his nephew Lot, Abraham, whose name is at first spelt Abram, moved from Ur to

Haran, near Edessa. Here Terah died, and thence, under divine guidance, Abraham migrated to Canaan. At Shechem, where it was revealed to him that his seed should possess the land, he raised his first altar to the Almighty.

Driven by famine to Egypt, he there described Sarai as his sister to Pharaoh—as later to Abimelech, king of Gerar—but no serious consequences followed this deception. Returning to Canaan, he gave Lot choice of the Jordan valley for his flocks, and pitched his tent by the oak of Mamre, near Hebron. After rescuing Lot from Chedorlaomer, king of Elam, and being blessed by Melchizedek, Abraham, despairing of an heir, followed the native custom by taking Sarai's Egyptian handmaid, Hagar, as his second wife, and thus became father of Ishmael. Then came the visit of the three heavenly messengers, with the promise of a son to Sarai, and

news of the pending destruction of Sodom and Gomorrah, for the people of which Abraham pleaded with Jehovah. Lot and his family were spared, though Lot's wife, for disobedience, was turned into a pillar of salt.

In due time Sarai bore a son, Isaac; circumcision was instituted, and Abraham's faith was severely tested by the divine command to offer up Isaac as a sacrifice. Sarai was buried in the cave of Machpelah. Abraham then married Keturah, by whom he had six sons; and after arranging the marriage of Isaac and Rebekah, the patriarch passed away, and was buried by Sarai's side in the grave at Machpelah, on the traditional site of which a Christian church and later a mosque were built.

As common ancestor of Arab tribes as well as of the Hebrews, Abraham, by whom the early faith in the one true God was restored,



As related in Genesis 22, God tempted Abraham to offer up his only son Isaac as a burnt offering. But when Abraham stretched forth his hand, and took the knife to slay his son, he was stayed by the angel of the Lord

ABRAHAM STAYED IN THE SACRIFICE OF ISAAC

Painting by Rembrandt at Leningrad

is to Jew and Moslem alike the supreme type of faithfulness, courage, generosity, and wisdom.

Abraham, WILLIAM (1842-1922). British labour leader. After some education at Carnarvon, he entered the coal mines, his father being a miner. Elected in 1886 M.P. for the Rhondda division of Glamorganshire, he retained his seat at several elections. In 1911 he was made a privy councillor. His gifts as a singer won for him the title Mabon. He died May 14, 1922.

Abrahamites. Sect of Syrian heretics. It was founded in the 9th century by Abraham of Antioch, who denied the divinity of Christ. The name was also given in the 18th century to certain deists in Bohemia, who falsely claimed to represent the teachings of John Hus.

Abraham Lincoln. Play by John Drinkwater (*q.v.*) based on the life of the great U.S. president. First produced Oct. 12, 1918, at the Birmingham repertory theatre under the author's direction, it was staged at the Lyric, Hammersmith, the following Feb., and ran there for 466 performances. William J. Rea played the name-part in each production. See Lyric Theatre, Hammersmith; Playfair, Sir Nigel.

Abraham Men. Slang term used in England in the 16th-18th centuries for a class of able-bodied beggars. One of the wards in Bethlem Hospital, London, was for lunatic beggars, and was named after Abraham, probably because of the reference in S. Luke's Gospel to the beggar carried into Abraham's bosom. These lunatics wore a special badge and were allowed to go about begging. Tom o' Bedlam or Abraham Man was the name given to a beggar of this type, and the country became infested with their imitators, known as sham Abrahams or Abram coves.

Abrahams, HAROLD MAURICE (b. 1899). British athlete. Born Dec. 15, 1899, and educated at Repton and Cambridge, he represented Great Britain in the Olympic games 1920-24, winning the 100 metres in the latter year. In 1928 he captained the British athletic team in the Olympic games.

Abrahams, ISRAEL (1858-1925). Jewish author. Born in London, Nov. 26, 1858, he was educated at the Jews' and University Colleges, London. For a time senior tutor at the Jews' College, he became Reader in Talmudic and Rabbinic Literature at Cambridge. He edited The Jewish Quarterly Review, 1889-

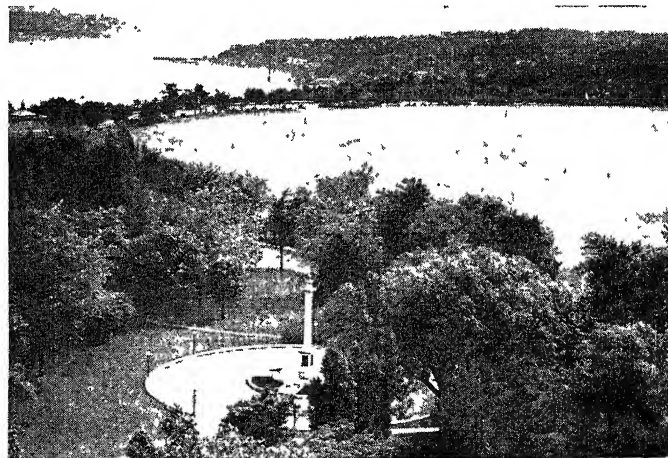
1908, and wrote on Jewish life. He died Oct. 6, 1925.

Abraham's Bosom. Figurative expression used by Jews and Christians to signify the abode of the faithful departed. It was so used by Christ in the parable of the rich man and Lazarus (Luke 16). The term is derived from the ancient practice of reclining on couches at meals, so that the head of each guest was leaning towards the bosom of his neighbour. Thus the chief guest was said to recline in the bosom of the host—the place of honour; *e.g.* in John 13 it is recorded that there was leaning on Jesus' bosom one of the disciples, whom Jesus loved.

Abrantes. Fortified town of Portugal, in the district of Santarém. It is on the right bank of the Tagus, 88 m. by rly. N.E. of Lisbon, and is picturesquely placed on a hill. Its castle is mentioned

from waterfalls, in France, Switzerland, Canada, and the United States. Low-grade abrasives are crushed quartz for sandpaper, etc.; quartz sand for plate-glass making and for etching glass and stone; feldspar and quartz for polishing powders, etc.; pumice powder, diatomaceous earth or tripoli for scouring materials; flint pebbles for use in grinding pigments, etc.; and, finally, grindstones, such as those made from the millstone grit of the Pennines, whetstones, hones, etc. See Carborundum; Grinding.

Abraxas. A mystic word engraved on gems anciently worn, sometimes in rings, as amulets. Analogous to abracadabra, the word abraxas dates apparently from the time of the Gnostic Basilides, and the Greek letters composing it, used as numerical characters, represent the number 365, held by the Gnostics to sym-



Plains of Abraham, near Quebec, Canada, showing the monument to Wolfe and Montcalm on the scene of Wolfe's great victory in 1759

by Camoens. It has a trade in oil, fruit, wine, and cereals. Founded by the Iberians about 300 B.C., it was colonised by the Romans. Pop. 8,000.

Abrases. Scouring and polishing materials used in a variety of manufacturing processes. High-grade abrasives are natural minerals, such as emery or corundum, or artificial products of alumina or silicon-carbide, such as carborundum; these materials are largely limited in use to the metal-working industries. Corundum is obtained from Palmer Rapids, Ontario. Corundum Hill, North Carolina, the Leydsdorp district in the Transvaal, and Madagascar. Emery is obtained from Turkey, Naxos, and Peekskill, New York State.

Artificial abrasives are, in general, made by electrical power obtained

bolise the spiritual manifestations of the Supreme Deity, the number of worlds forming the universe, or the number of days in the solar year. Abraxas amulets, which often bear capricious symbols or figures, were largely imitated in medieval times. The word is said to be derived from the Coptic for Holy Name or the Hebrew Ha-Brachah, blessing. See Gnostics; consult also The Gnostics and their Remains, C. W. King, 1887.

Abraxas. A species of moth, best known as the magpie moth (*Abraxas grossulariata*), which destroys the leaves of bush fruit-trees. The grubs are pale in colour, with black spots, and arrive at the usual caterpillar stage in early summer. They are best dealt with when the fruit is in the early stages of formation, and

may be destroyed by the employment of a mixture of lime and soot, after a heavy rain has fallen, when the foliage is wet. When full grown, the Abraxas moth is a little over one inch in length, pale buff in colour, with black spots.

Abrial, JEAN MARIE CHARLES (b. 1888). French naval officer. As vice-admiral in 1940, he assisted with the forces under his command in the Dunkirk evacuation. Under Pétain he became resident-general in Algiers (1940) and secretary of state for the navy (1942-43). In 1946 he was sentenced to 10 years' hard labour for collaboration with the Germans; but this was later halved, and in 1947 he was set at "conditional liberty."

Abrogation (Lat. *ab*, away; *rogare*, to propose). English legal term, meaning the absolute annulment of a law by the proper legislative authority. It must be distinguished from suspension, which is the temporary suspension of the operation of a law; e.g. of the writ of Habeas Corpus in times of revolutionary outbreaks. It must not be confounded with dispensation, the exemption of an individual from compliance with a law. Derogation is taking away part of a law; and subrogation is adding something to it.

Abruzzi, LUIGI AMADEO, DUKE OF THE (1873-1933). Italian explorer and man of science. The third son of Amadeo, duke of Aosta and king of Spain, 1870-73, and cousin to Victor Emmanuel III, king of Italy, he was born in Madrid, Jan. 29, 1873. He ascended Mt. St. Elias, Alaska, July 31, 1897, being the first to do so. He organized an Arctic expedition, 1899-1900, and from his ship, the *Stella Polare*, sent out sledging parties, one of which attained lat. 86° 33' N., beating previous records. His expedition determined the N. coast of Franz Josef Land. In Africa he ascended Mt. Ruwenzori in 1906, and in 1909 he established a new record in mountain-climbing by ascending

Mt. Godwin-Austen, Kashmir, to an alt. of 24,600 ft. Meanwhile he had served in the Italian navy, of which he was commander-in-chief in 1915-17. He also commanded a squadron during the Tripoli war 1911-12. In 1919 he explored the sources of the Webi Shebeli in Abyssinia, and in 1927 surveyed large areas in Abyssinia. He died March 18, 1933.

Abruzzi e Molise. Department or compartimento of central Italy, comprising the provs. of Aquila, Teramo, Chieti, Pescara, and Campobasso. The first four formed the Abruzzi and the last the Molise of the old kingdom of Naples. Its area is 6,387 sq. m. Sloping E. and W. from the Apennines, where rises the Gran Sassa d'Italia (9,600 ft.), it is mainly mountainous, with valleys running N.E. to the Adriatic. Snow lies on the heights all the winter, and the climate is severe. Forests abound, with pastureage lower down, and in the fertile valleys cereals and wine are produced. Cattle, sheep, and pigs are reared, and silk and outlery manufactured. Pop. 1,677,146.

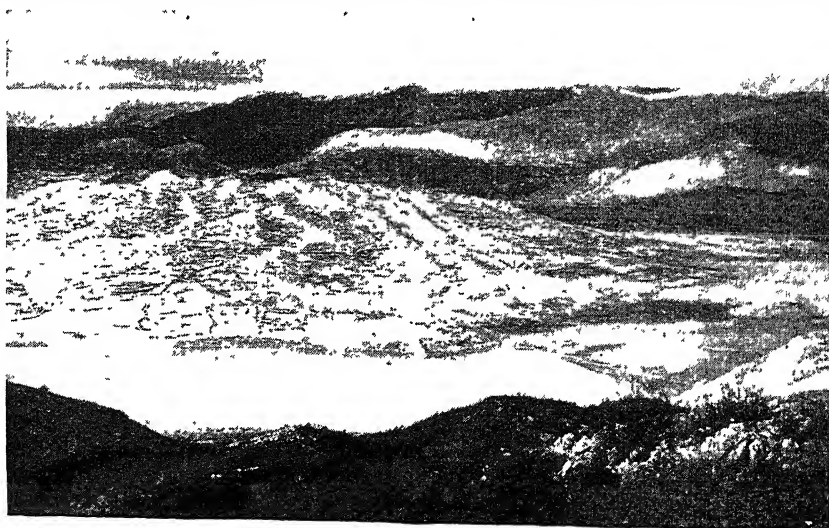
During the Second Great War there was fighting in the dept. from Sept., 1943, to June, 1944, and damage was severe, a number of small towns being razed to the ground by the Germans, who also committed many acts of vandalism during the quiescent winter of 1943-44. Termoli and Ortona were among larger towns badly damaged. Abruzzi e Molise not being rich in antiquities, however,

artistic and historical losses were not great.

Absalom. Third and favourite son of King David (O.T.). His mother was Maacah, daughter of Talmai, king of Geshur. As described in 2 Sam. 13-18, he was renowned for personal beauty and reckless ambition. Absalom's unfilial conduct was David's punishment for his sin with Bath-sheba. Absalom's sister Tamar having been wronged by her half-brother Amnon, Absalom compassed Amnon's death. Exiled by David, he rewarded his father's forgiveness by raising a revolt, in which he was joined by Ahithophel, Bath-sheba's grandfather.

David fled beyond the Jordan, and Absalom, entering Jerusalem, took possession of David's harem. But at the instigation of David's friend Hushai, Absalom's army was routed in the wood of Ephraim. Fleeing on a mule, Absalom was caught by the head in the boughs of a great oak, and there killed by Joab against David's express orders. David's grief—expressed in the words: O my son Absalom, my son, my son Absalom! Would God I had died for thee, O Absalom, my son, my son—was met by Joab's rebuke that David loved his enemies and hated his friends. The so-called Tomb of Absalom near Jerusalem seems to belong to the Greco-Roman period.

Absalom and Achitophel. Famous English satire, written by John Dryden in 1681. Representing the duke of Monmouth as



Abruzzi e Molise. Wild mountainous country in Italy N. of the river Sangro. There was heavy fighting here during the Second Great War
Photo. British Official, Crown Copyright

Absalom and Lord Shaftesbury as Achitophel, the satirist drew remarkable parallels between the times of Charles II and those of David and Absalom, all his contemporary characters and parties being thinly disguised under Biblical names. A Second Part of the satire, 1682, was mainly written by Nahum Tate, Dryden's contribution to it being only about 200 lines.

Abscess (Lat. *ab*, from ; *cedere*, to go away). Collection of pus or matter bounded by tissue called the abscess wall. An acute or inflammatory abscess is due to septic infection by bacteria, and is usually treated by hot fomentations in the earlier stages and incision in the later. A chronic or cold abscess is nearly always a manifestation of tuberculosis (*q.v.*), and may indicate deep-seated disease. *See* Bacteriology ; Inflammation ; Penicillin.

Abscissa. In plotting a graph on squared paper, points on the curve of the graph measured from the horizontal basis or axis are abscissae, those measured from the vertical axis being ordinates. *See* Co-ordinates ; Graph.

Absentee (Lat. *absens*, being away). In general, one who is absent, but the word has come to be specially associated with Irish landlords. Many of these, while continuing to draw their rents from Ireland, lived elsewhere, and the Irish regarded it as a grievance that the money paid by them in rent should be spent in other lands. The problem was an old one, and in Tudor times measures were taken against absentees. For some years in the 18th century the holders of offices in Ireland had their incomes heavily taxed unless they resided in the country. The question was again acute in the 19th century, after the union of the Parliaments had provided an additional reason for absenteeism from Ireland, but it was largely resolved by the gradual transfer of the land from the landlords to the tenants.

Before the Revolution there was a good deal of absenteeism among French landlords. The U.S.A., Canada, Australia, and other new countries have many absentee landlords, owning large tracts of land but living elsewhere.

Absinthe (Greek *apsinthion*, wormwood). High percentage (50 to 85) alcoholic liquor prepared from flower and leaves of *Artemisia absinthium*, or wormwood. To the oil of wormwood angelica, star anise, hyssop, balm, mint, cinna-

mon and other aromatics are added, the artemisia being digested first with spirit and the aromatics for a few days. The resulting infusion is steam-heated with artemisia, balm, and hyssop leaves to extract the chlorophyll which gives a characteristic green colour. The bitter principle in genuine absinthe has toxic characteristics, and manufacture and sale have therefore been controlled in several European countries.

Absolute (Lat. *absolutus*, free). Philosophical term. That which exists in and by itself, independently of all other conditions or relations, and cannot be other than it is. Its opposite is relative.

Absolute Units. Fundamental units, such as the centimetre (length), gram (weight), and second (time), which form the basis of the C.G.S. system of scientific units and from which other units are derived. Absolute temperature is calculated from the absolute zero which, by the laws of thermodynamics, is the lowest temperature that can exist. It is -273.1° centigrade. *See* Units.

Absolution (Lat. *ab*, from ; *solutus*, free). Theological term for the forgiveness of sins, after public or private confession, pronounced by priest to penitent in the name of God. Absolution was recognized by the Jews (2 Sam. 12). The forms used in Christendom vary with the doctrine, but are based on interpretations of Matt. 16 and 18, John 20, Acts 2, 2 Cor. 2 and 5, and James 5. Anglican usage is as prescribed in the Book of Common Prayer. In the Roman Catholic Church there is an office of absolution for the dead. Contrition and, where wrong has been done, restitution are essential to absolution. In law the word implies acquittal. *See* Confession, Auricular.

Absolutism. Condition or principle of rule by a single individual uncontrolled by any other constitutional authority. In practice, the power of an absolute ruler is limited by what his people will endure without revolting. The Tyrants of ancient Greece, such as Polycrates of Samos and Periander of Corinth, and in modern times the Tsar of Russia before the revolution of 1917, are examples of absolute rulers. *See* Government ; Sovereignty.

Absorbent Materials. Materials which have the property of absorbing liquids, gases, heat, light, or sound. In building, bricks, stone, cement and concrete need damp-proofing treatment to

prevent their absorption of water. Bricks vary in their absorbent qualities from 3 per cent of their volume for the hardest blue bricks to 22 per cent for ordinary stock bricks, the average brick absorbing water to about 15 per cent of its volume. Stone varies from $\frac{1}{2}$ per cent for granite to 10 per cent for sandstone and 13 for Portland stone. Absorption in concrete depends upon the proportions and quality of the cement and sand used.

Chemicals used to absorb moisture from the air include sodium chloride and zinc chloride (driers).

For surgical and other purposes cotton is made absorbent by removing from the fibre its natural wax. Waste or unspinnable cotton is boiled with caustic soda leaving a virtually pure cellulose. This is employed for surgical dressings, for making gun-cotton, and in the manufacture of artificial silk.

Gases are absorbed by carbon, especially wood charcoal, in varying proportions. One volume of amorphous (non-crystalline) carbon can absorb as many as 85 vols. of hydrochloric acid or 90 vols. of ammonia, the amount increasing considerably with the temperature. Because of this property, charcoal is used in gas masks as a dyspepsia remedy, and in industrial processes. *See* Adsorption.

Certain materials such as asphalt and bitumen have special capacities for the absorption of heat and have therefore to be insulated against it. Thermal insulation in general is achieved by the presence of inert air cells in fibrous or sponge-like material.

Materials used in the absorption of sound are noted under Acoustics.

Absorption (Lat. *absorbere*, to suck in). Sucking up of a liquid solution throughout the mass of the solid absorbing material.

ABSORPTION OF LIGHT. This is the retention of some part of the light from any luminous source, by the medium air, water, or a transparent or semi-transparent solid through which the light travels. If a luminous body be in a perfect void the energy of its light loses nothing as it travels outwards. But between the stars there is light absorbing matter ; it contains an uncertain quantity of cosmic dust and, it is supposed, some unilluminated matter agglomerated in dark nebulae.

The atmospheres of planets may also be highly absorbent, *e.g.* in the cloudy atmosphere of the planet Venus. But as on the one hand no medium is entirely transparent to light, and always absorbs some

part of its energy, so no body is entirely opaque, for light can penetrate some distance into all bodies. The Röntgen Rays can travel through many bodies which are customarily regarded as opaque to ordinary light rays.

The amount of light absorbed by a body defined as opaque is influenced considerably by the nature of the body's surface. Thus, a polished white or metallic surface reflects the greater part of the light which falls upon it; a black unpolished surface absorbs nearly all of it, because the light penetrating between the particles of the surface layer is unable to escape by reflection and is consequently absorbed. A body's ability to retain the light which falls on it is called its absorptive power. One which absorbed all light radiations of whatever kind would be called a perfectly black body, though no such body exists. Lamp-black, however, nearly fulfils the condition. *See* Light; Spectroscopy.

Absorption of Gases. All the plants which contain chlorophyll absorb their carbon from the carbonic acid of the air, or, if the plants are submerged, from the gas held in solution by the water, which gas is decomposed under the influence of light by the cells which contain chlorophyll. If a water plant is placed in water containing carbonic acid and is exposed to sunshine, bubbles of oxygen are given off from the cut stem or leaf. The carbonic acid is decomposed in the chlorophyll corpuscles in such a way that part of the oxygen is restored to the atmosphere, and the residue combines with the water to form such compounds as starch. A certain temperature is required, and light is indispensable. No carbon is absorbed by green plants in any other way; and there is no instance in nature of the conversion of carbonic acid into similar carbonic compounds.

Liquids are able to absorb gases even when not entering into chemical combination with them. The volume of gas which the unit volume of any liquid—water, oil, liquid metals—can absorb depends on the nature of the gas and on the temperature. The number of unit volumes of a gas which can be absorbed by a unit volume of a liquid at 15° C. is called the *absorption coefficient* of the liquid. The absorption coefficient of carbonic acid in water is 1, of oxygen 0.035, of nitrogen 0.017.

ELECTRICAL ABSORPTION. For any given insulator, or substance which resists the passage of elec-

tricity, there is a dielectric constant which is the ratio of the induction to the electric intensity. But substances other than gases do not *instantaneously* acquire their maximum induction in an electric field. It seems that they require time to absorb the charge; and this phenomenon is called electric absorption. If a Leyden jar be given a charge and its potential is measured, the potential will be found to fall for some time, but will at last become constant. Similarly, if the jar is discharged the whole electric induction does not disappear at once; but successive discharges getting smaller and smaller may be obtained. *See* Absorbent Materials, Adsorption; Gas.

Abstinence (Lat. *abs*, from; *tenere*, to refrain). In common usage the terms total abstinence and total abstainer refer only to persons who abstain from intoxicating liquors. *See* Temperance.

Abstinence, DAYS OF. Days appointed in the churches to be observed by abstinence from flesh food. In the Anglican church the words fasting and abstinence are used indifferently, and fasting or abstinence is enjoined during the forty days of Lent, the twelve Ember days, the three Rogation days, all Fridays except when Christmas Day falls on a Friday, and the eves of certain festivals. In the Roman Catholic church a distinction is observed between fasting and abstinence, and the days of abstinence vary in different countries. The general rule is that all Fridays, the Wednesdays of Advent and Lent, the Ember days, the eves of Christmas, Easter, Pentecost, SS. Peter and Paul, Assumption, and All Saints, are days of abstinence. *See* Fasting.

Abstraction (Lat. *abs*, from; *trahere*, to draw). Philosophical term for the mental process by which one or more particular qualities or characteristics of an object, such as the whiteness of snow, are separated from the rest and considered independently of the substance to which they belong. The notion thus acquired is an abstract idea (whiteness). By means of abstraction we discover what qualities are common to a number of objects, and thus arrive at concepts or general notions.

Abstract of Title. Summary of all dealings affecting title to property. In the sale or purchase of land or houses the chief consideration is what interest the vendor has in the property. The seller must take care to specify exactly what interest he has to

dispose of, and the buyer must take care that he is getting a title that cannot be challenged. *See* Land Laws.

Abstrich (Ger. *abstreichen*, to wipe off). Term used in metallurgy. In the process of refining lead in a reverberatory cupelling furnace, particularly as practised at Freiberg in Germany, a scum collects on the surface of the molten metal. This scum, or *abstrich*, is scraped off, and varies in colour from a dark brown to a light yellow, according to its composition. It is principally litharge, i.e. oxidised lead. *See* Lead.

Abt, FRANZ (1819-85). German song writer. Born Dec. 22, 1819, he was destined to the church, his father being a clergyman, but adopted music as his profession. He wrote more than 200 songs, the best known being *When the Swallows Homeward Fly*. He died at Wiesbaden March 31, 1885.

Abu. Arabic word meaning father, Hebrew *ab*. In some compounds it expresses the actual parental relationship, as *Abu'l Qasim*, the father of *Qasim*; in others, merely possession or close connexion, as *abu en-nom*, father of sleep, the poppy; *abu riyah*, father of winds, weathercock; *abu naddara*, wearer of spectacles. It is common in place-names; for instance, *Mount Abu*.

Abu-Arish. Walled town of Arabia. In the N. of the Yemen, 24 m. from the Red Sea. Pop. 8,000.

Abu-Bekr (573-634). Name, meaning father of the virgin, borne by the first caliph or successor of Mahomet. It was substituted for his original name *Abd-el-Kaba* after the marriage of his daughter *Ayesha* to the Prophet. Born at Mecca, he was a wealthy merchant of the Koreish tribe. He was devoted to Mahomet, his sole companion during the flight from Mecca to Medina, and was designated his successor by the Prophet himself. The claim to the Caliphate put forward by Mahomet's son-in-law *Ali* divided Mahomedans into sects known as Sunnites and Shiites, the supporters of *Abu-Bekr* and *Ali*. *See* Caliph

Abu Debi or **THABI**. Town of S.E. Arabia, on an island in the Persian Gulf, the headquarters of the local pearl fisheries. Pop. 18,000.

Abu-Hammed. Town in the Anglo-Egyptian Sudan. Situated at the great bend of the Nile, 230 m. by rly. S.E. of Wady Halfa, it was captured Aug. 7, 1897, by the Anglo-Egyptian troops. Before the construction of the rly., caravans started from here across the Nubian Desert to Korosko.

Abu Hassan. Hero of the story, *The Sleeper Awakened*, in *The Arabian Nights*. He is a citizen of Bagdad who, entertaining the Caliph unawares, becomes his friend and favourite. A similar story is told of the drunken tinker in the *Induction to Shakespeare's Taming of the Shrew*.

Abukir, ABOUKIR, OR ABU-QIR. Village in Egypt, on Abukir Bay, 14 m. N.E. of Alexandria. Near here Nelson at the battle of the Nile defeated the French fleet,

Rahman III, he wrote his medical *Vade Mecum*, a sort of encyclopedia in 30 sections, the last and most important of which dealt with surgery, hitherto neglected by Moslem authorities. This work, long the standard text-book of European surgery, was one of the foundations on which modern surgical science was built.

Abulfaraj (1226-86). Armenian bishop and writer in Arabic and Syriac, surnamed *Bar-Hebraeus*. Born at Malatia, Armenia, of

Abridgment of the History of the Human Race from the Creation to 1329, and a Geography.

Abul Ghazi (1605-63). Khan of Khiva, said to be a descendant of Jenghiz Khan. He is the author of a genealogical history of the Mongols and Tartars from Adam to his own times. A version from the dictation of a Bokharan merchant was rendered into German and introduced into Europe by some Swedish officers, who had been interned in Siberia.



Abukir. On March 21, 1801, in the battle of Abukir Bay, Egypt, Sir Ralph Abercromby (q.v.), commanding the Mediterranean expedition, defeated the French under Baron de Menou, but was himself mortally wounded, dying a week later

Painting by Philippe Jacques de Loutherbourg, B.A.

Aug. 1, 1798, Napoleon overcame the Turkish army, July 25, 1799, and Abercromby defeated the French, March 21, 1801. In the neighbourhood are extensive Egyptian and Roman remains, including the ruins of Canopus. The old Canopic mouth of the Nile emptied itself into the bay. *See Nile, Battle of the.*

Abu Klea. Name of some wells in the Sudan, on the route from Korti to Metemneh, where the British repulsed the dervishes in 1885. The expedition led by Lord Wolseley was proceeding along the Nile to the relief of Gordon. To save time by avoiding the loop made by the Nile above Dongola, a camel corps under Sir Herbert Stewart was sent across the desert. On Jan. 17 this was attacked at Abu Klea, and on the 19th at Abu Kru, where Stewart was mortally wounded. The little force reached the Nile near Khartum, but was too late to save Gordon.

Abulcasis (d. c. 1013). Arabian physician. Practising at Cordova in Spain, where he was court physician to the Caliph Abd-ur-

Jewish descent, he was distinguished by his knowledge of languages, philosophy, theology, and medicine. Made bishop of Gubas at the age of twenty, he took the name of Gregorius. His best-known writings are a *Chronicle of Universal History* and a commentary on the Syriac version of the Bible.

Abul Fazl (1551-1602). Indian historian. A vizier of the Mogul emperor Akbar, he won fame with his *Akbar Nameh (Book of Akbar)*, consisting of a history of Akbar's reign and an account of the political, civil, and religious institutions of the India of his time. It has been translated from the Persian into English. Abul Fazl was assassinated at the instigation of Akbar's son Selim, afterwards the emperor Jehangir.

Abulfeda, ISMAIL-IBN-ALI (1273-1331). Arabian writer and warrior. Born at Damascus, he distinguished himself as a military leader, especially against the Crusaders. In 1312 he was made prince of Hamah, in Syria. His best-known writings are an

An English translation was published in 1730, and the original text at Kazan in 1825 and St. Petersburg in 1871.

Abulug. River of Luzon, Philippine Islands. It rises in the Cordillera del Norte and flows N.E. some sixty miles to the N. coast of the island, through a valley rich in tobacco, rice, and maize.

Abu Mansur Muwaffaq (d. c. 950). Persian physician. He wrote nearly a thousand treatises on simple drugs and a pharmacopoeia called *The Foundations of the True Properties of Remedies*, in which 585 drugs are described, the information being drawn from Greek, Syriac, Persian, Arabian, and Hindu sources. The first medical book in modern Persian, it is also one of the earliest prose works in that language.

Aburi. Health station, British Gold Coast Colony, 25 m. N.E. of Accra. In the Aquapim Hills, at alt. of 1,400 ft. it has a sanatorium and botanical gardens.

Abushere. Variant spelling of the name of the Persian port Bushire (q.v.).

Abu-Simbel OR **IPSAMBUL**. Locality in Egypt, on the left bank of the Nile, 40 m. N. of Wady Halfa. It is celebrated for its remarkable rock temples of **Rameses II**. The great temple of Ra, 180 ft. deep, has a cliff-hewn façade with four enthroned colossi, 65 ft. high, the largest sculptured figures in Egypt. The smaller temple of Hathor has four standing colossi, 33 ft. The larger colossi represent **Rameses II**; with the smaller are two figures of his queen **Nefrêre**.

Abu-Tellul, **BATTLE OF**. British victory over the Turks. On July 14, 1918, the Turks attacked the British under Allenby on both sides of the river Jordan, N. and E. of Jericho. W. of the river they captured Abu-Tellul, but were driven out an hour later in a counter-attack by the Australian Light Horse, and suffered heavy loss, 350 prisoners being taken, including 276 Germans.

Abu-tig, **ABUTIJ** OR **ABUTIZH** (anc. *Abutis*). Coptic town in Upper Egypt. It is situated on the Nile, 15 m. S.E. of Assiut. In the neighbourhood are rock-tombs and other remains. Pop. 10,500.



Abutilon

Abutilon. Favourite garden and greenhouse shrubs of the mallow family (*malvaceae*), chiefly natives of South America and the West Indies. The flowers agree in the main with those of *hibiscus*, except that there is no second calyx (*epicalyx*) composed of bracts below the flower. The calyx is cup-shaped, cleft into five pointed lobes. The petals are five, attached at the base to a tube consisting of numerous united stamens. The five carpels are connected by their edges, but open separately at the top. The five petals are white, orange, and crimson in the various species. The forms mostly grown are garden hybrids between the natural species, and are preferred because they flower more freely. In Britain they attain heights varying from 4 ft. to 12 ft., and are propagated by means of seeds sown in spring in a mixture of loam and peat. They grow freely in the open in summer, especially in southern counties.

Abyad (Arab. white). Arabic word common in place-names. An example is **Bahr-el-abyad**, the white river, one of the branches



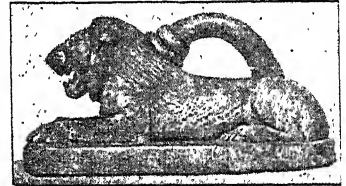
Abu-Simbel. Façade of smaller of the rock temples built by **Rameses II** and dedicated to his consort and to Hathor, female counterpart of Osiris

of the Nile, as distinguished from **Bahr-el-azrek**, the blue river.

Abydos. Ancient city of Asia Minor. It stood on the narrowest part of the Hellespont, opposite **Sestos**. It is associated with **Byron's** poem *The Bride of Abydos*. It was here, opposite **Sestos**, that **Leander** swam the Hellespont to visit **Hero**; and **Xerxes** threw bridges of boats across to transport his army to Europe during the expedition against Greece, 480 B.C.

Abydos. Ancient city of Upper Egypt, near the left bank of the Nile, 350 m. S. of Cairo. The Egyptians called it reliquary hill, because the head of **Osiris** was traditionally interred there. The necropolis was the burial-place of the Egyptian kings for many centuries, the tombs including that of **Menes**, the first historical ruler of Egypt. **Seti I** built the great temple, the **Memnoneion** of **Strabo**, containing a list of kings called the **Table of Abydos**; and

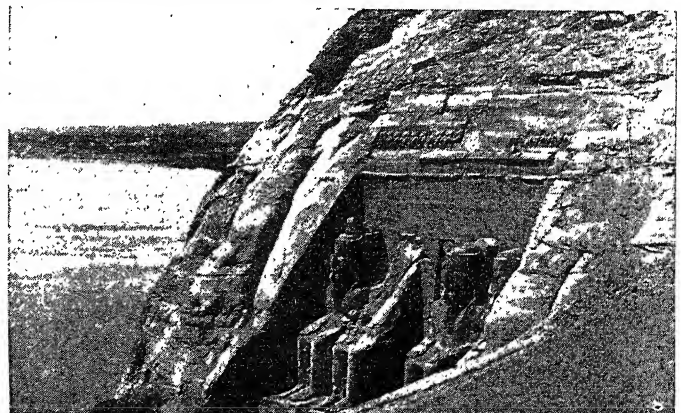
Mineptah built a hall for the Osirian mysteries.



Abydos. Bronze weight inscribed in Phoenician "Found correct by the keepers of the Treasury"

Found at Abydos, Asia Minor

Abyss (Gr. *a*, not; *byssos*, depth, bottom of the sea). Name given by the Jews of the Christian era to a large underground pit, the dwelling-place of the dead and evil and revolted spirits. Here also punishment was meted out to sinners. The word abyss is retained in the Revised Version of the New Testament, but in both versions of the Old Testament deep or bottomless pit is used.



Abu-Simbel. Entrance to the great temple, showing four colossi of **Rameses II**, two on each side, hewn out of the cliff, and 65 ft. in height

ABYSSINIA: LAND OF THE ETHIOPIANS

Evans Lewin, Author of *A Geography of Africa*

For further information see East African Campaign; articles on Addis Ababa and other towns; and the biographies of Haile Selassie, Menelek II, Napier of Magdala, and others

The country of Abyssinia, the official name of which is Ethiopia, is an inland independent empire in N.E. Africa, bounded on the N. by the former Italian colony of Eritrea, W. by the Anglo-Egyptian Sudan, E. by French and British Somaliland, and S. by Kenya (British East Africa) and the former Italian Somaliland.

TOPOGRAPHY. Extending for 900 m. from W. to E. and for about 750 m. from N. to S., Abyssinia resembles a triangle in shape, with the apex towards the N. The area is about 350,000 sq. m. The Abyssinian region, including Abyssinia proper, may be divided into four distinct zones: (a) the narrow maritime plain occupied by the European Powers, extending through Eritrea and French Somaliland to Cape Guardafui, and thence turning S. and widening into the expanse of the former Italian Somaliland and Abyssinian Somaliland; (b) the maritime ranges, generally parallel with the coast; (c) the raised undulating plateaux which culminate in the Harar highlands, and are continued S. in the hilly country which forms the basins of the Webi-Shebeli (Wabi-Shevegli) and the Juba; and (d) the region bordering the Anglo-Egyptian Sudan, which is mountainous, rising gradually from the W., and intersected by numerous deep valleys and remarkable ravines, some nearly 4,000 ft. in depth.

The mountains, which occasionally rise to 15,000 ft., are rugged and precipitous, particularly towards the E. The E. wall of the interior highlands runs due S. until it reaches the valley of the river Hawash. Here the main range bends to the S.W., while another chain continues in the original direction. From this a third range, the Harar, runs E. towards the Gulf of Aden. The loftiest peaks are found in the Simyen range, where the snow-capped summit of Ras Dashan, N.E. of Lake Tsana or Tana, reaches 15,160 ft. The principal rivers forming the head-streams of the Abbai, or Blue Nile, issue from Lake Tsana, near which the Atbara, also a tributary of the Nile, takes its rise. Other rivers are the Hawash, the Takkazyé, and the

various tributaries of the Juba; but none is navigable, except for small craft. The torrential waters of the Blue Nile and the Atbara during the rainy season are largely responsible for the annual Nile flood. In the dry season these rivers almost cease to flow. In spite of its tropical situation, the climate of Abyssinia is usually salubrious and agreeable, owing to the general elevation of the country, although in the deep valleys and on the S. plains the heat is often oppressive. The rainy season proper begins about the middle of June and ends at the beginning of October.

PEOPLE AND LANGUAGE. The population of Abyssinia is estimated at about 8,000,000. The Abyssinians proper are a brown, well-formed people belonging to a Semitic stock, originally from the other side of the Red Sea, and speaking Ethiopic, a language closely allied to the old Sabaean. Ethiopic is the sacred language of the priests, but forms the basis of the present Abyssinian. The modern language of Amhara (Amharic) is the common tongue of the country. The Abyssinians may be divided into four groups: the Gallas in the S. and S.W., who entered Abyssinia early in the 16th century; the Amharas, or

Abyssinians proper, in the central districts, who number about two millions and include the ruling class; the Somalis in Harar, the Somaliland plateau, and the S.E.; and the Danakil or Afars in the E. In addition there are numerous Jewish tribes, called Falashas, who retain many national customs, and also Arabs, Indians, Greeks, Armenians, etc.

RELIGIONS. The Amharas are Christians, and so too are some of the Gallas. The rest of the Gallas, the Somalis, and the Danakil, are Mahomedans, with an admixture of pagans. The Falashas are Jews.

The Abyssinian Church, or Church of Ethiopia, is a branch of the Coptic Church of Egypt, and dates from the 4th century, when Athanasius of Alexandria consecrated Frumentius its first metropolitan or abuna. Since that time the abuna has been a Coptic monk chosen by the Coptic patriarch in Egypt, except when the ruler himself has taken the office. Frumentius found Jewish rites existing with traces of Christianity. The Christianity is still mixed with Judaic and pagan customs, though it approximates somewhat closely to the Greek form, the chief distinction being the profession of Monophysitism—i.e. that in Christ was but one nature, the divine, a heresy adopted in the 5th century. There are many monasteries and convents under the control of native-born bishops. In the 16th



Abyssinia. A country in N.E. Africa, extending for 900 m. from W. to E. and about 700 m. from N. to S., with an estimated population of 8,000,000

and 17th centuries and later, unsuccessful attempts were made to introduce Roman Catholicism; Mahomedanism has been also kept back and Anglican missions have had little success.

CONSTITUTION AND GOVERNMENT. Abyssinia is an empire, ruled by an emperor, termed the Negus Negusti, or King of Kings, to whom the chiefs or governors-general of the twelve political provinces owe allegiance. Under the constitution granted by Haile Selassie in 1931 and restored in 1942, the autocracy of the Negus is modified by a Chamber of Nobles nominated by him, and a Lower Chamber nominated by nobles and local chiefs.

Although by an edict issued in 1907 education was made compulsory for all male children above the age of twelve, there were few educational establishments in the country prior to Haile Selassie's accession.

PRODUCTS AND RESOURCES. Abyssinia is essentially a pastoral and agricultural country, although highly mineralized. The vegetation is governed by elevation. In the S. cotton does well, while farther N., in Kafa, coffee, which derives its name from this district, is indigenous. Coffee is also grown in Harar. Sugar can be grown in the S. zone, and indigo, oranges, and bananas are abundant. The forests produce ebony, mahogany, and other hard woods, as well as acacia and bamboo. The fauna is as varied as the flora. Wild animals are represented by the elephant, lion, wolf, zebra, leopard, and hippopotamus; and domestic animals include the horse, donkey, mule, camel, sheep, ox, and goat. The country is on the whole extremely fertile and suited for the most varied products. The minerals comprise coal, iron, gold, silver, copper, and sulphur, but,

with the exception of gold, are almost unworked. In the S. and S.W. districts gold is found along the river courses and is worked by the Gallas, and in the Walega district there are veins of gold-bearing quartz. Most of the gold extracted is used in the country in the form of ornaments and trinkets. There is a considerable trade in rock salt.

The main avenue of trade is the French-Ethiopian Rly., which runs from the port of Jibuti in French Somaliland to the Abyssinian capital at Addis Ababa, a distance of 486½ m., and was completed in 1917. During the Italian occupation (1936-41) the road system was greatly improved.

In the W. goods are conveyed from Goré to Gambela and thence to Khartum, and farther N. trade passes through Gallabat to Khartum. Normally the exports are approximately valued at £1,250,000 and the imports at £1,000,000 per year. The exports principally consist of coffee, skins and hides, beeswax, ivory, rubber, butter, and herbs.

Salt as Currency

The chief towns are Addis Ababa, the capital, Dire Dawa, Harar, and Gondar. The currency before the Italian conquest consisted of the Maria Theresa dollar and the Menelek or standard dollar, introduced in 1894 and worth about 2s. Bars of salt of a uniform size are a recognized means of exchange, and in most places a system of barter still prevails. The Bank of Abyssinia has its head offices at Addis Ababa. It was chartered in 1905, and is empowered to mint the coinage of the country and to make note issues.

HISTORY. Long prior to the Christian era there was intercourse between Egypt and Ethio-

pia, and according to Abyssinian tradition the queen of Sheba, who visited Solomon, was a ruler of that country. From their son, Menelek, the kings of Abyssinia claim descent. Under the Ptolemys close relations existed with both the Jews and the Greeks. But the rise of the Mahomedan power cut off the Abyssinians from the rest of the world.

Land of Prester John

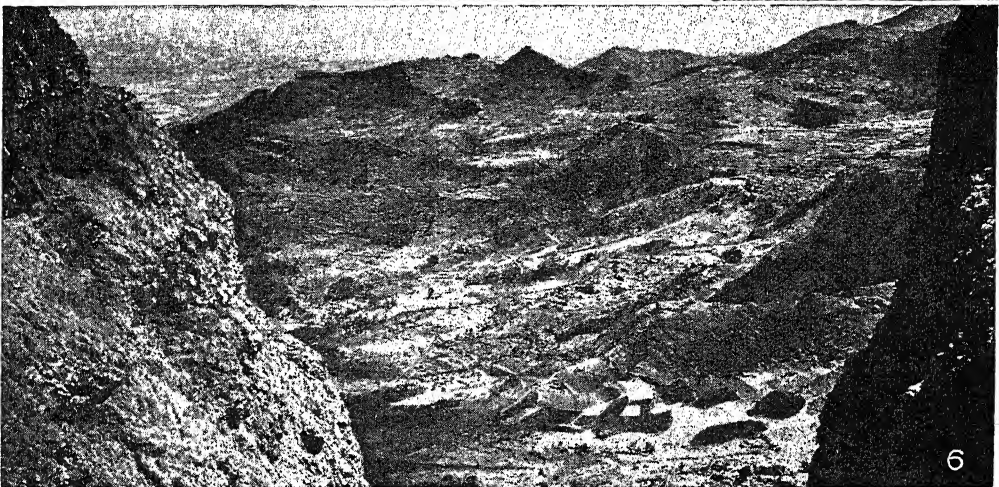
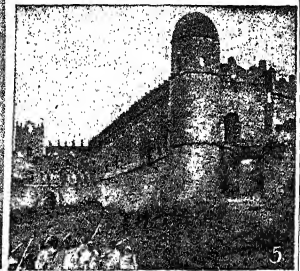
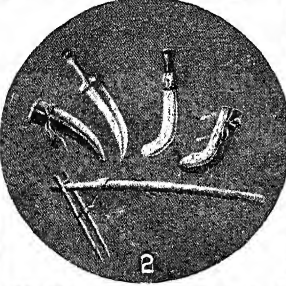
For some centuries little was heard of the country, but vague rumours reached Western Europe of a Christian kingdom, ruled by a monarch called Prester John. At the end of the 15th century, when Portuguese missionaries first penetrated into the country, it had become divided into several independent and warring states. Pedro de Covilham, who visited Abyssinia in 1490, announced that he had discovered the kingdom of Prester John, and was followed by other Portuguese travellers and missionaries. With the decline of Portugal, Abyssinia was again isolated from Europe, and between the visits of the French physician, C. J. Poncet, in 1698, and the British traveller, James Bruce, in 1769, no European appears to have entered the country. For 300 years a continuous struggle for supremacy was in progress between the three kingdoms of Tigré, Amhara, and Shoa, and the over-lordship was generally secured by the ruler of Amhara.

In 1805 Abyssinia was visited by a British mission. In 1830 Protestant missionaries, notably Dr. Ludwig Krapf, the discoverer of Mt. Kenya, and Bishop Samuel Gobat, were received at the court. In 1838 the missionaries were obliged to leave. In the middle of the 19th century Kassa, an adventurer of great ability, acquired power in Amhara, proclaimed himself emperor as Theodore III and conquered Shoa.

For a time Theodore ruled wisely, but owing to supposed slights received from the British government he turned against the British consul and other British officials and imprisoned them in chains. This action necessitated the sending of an expedition in 1868, under Sir Robert Napier, later Lord Napier of Magdala. Magdala was stormed and taken, April 13, 1868, when Theodore, deserted by his followers, committed suicide. After his death, Prince Kassai, the chief of Tigré, became Negus, and was crowned as Johannes II in 1872, while



Abyssinia. During the Italian occupation many military roads were constructed. Here is seen one section of the Imperial Highway between Dessie and Addis Ababa



1. Chief of the Oualamo tribe. 2. Primitive agricultural implements of the Oualamos, with two of their daggers and dagger cases. 3. Ceremonial costume of a woman of Harar. 4. Abyssinian girl. 5. Governor's castle

at Gondar. 6. Typically rugged country seen from the caravan route between Addis Ababa and Dessie. 7. Native farmer crushing grain with a pestle and mortar. 8. Street in the ancient market town of Harar

ABYSSINIA: PEOPLE AND PLACES OF AN ANCIENT AND STILL PRIMITIVE LAND

Menelek, the son of the former ruler of Shoa, became chief of that province. War with the Khalifa occurred in 1887, when Gondar



Abyssinia. Coin of Menelek II, wise and able ruler from 1889 to 1913

was sacked and burned. On March 9, 1889, the emperor Johannes was killed in battle by the dervishes, and Menelek II became ruler of all parts of the country.

The new emperor was a man of great ability, who maintained the independence of his country. The advance of the Italians from Massawa was resisted by Johannes in 1887, and Menelek, at first favourable, refused to recognize an Italian protectorate. A large Italian force sent against Abyssinia in 1896 was decisively beaten at Adowa, March 1. From that time Menelek consolidated his position, introduced stability into his government, set up a Cabinet in 1907, and kept the empire out of debt. His wife, Taitou, was a woman of great force of character, and during a long illness of Menelek she virtually governed the country. She died Feb. 11, 1918. The death of Menelek, in Dec., 1913, when he was succeeded by Lij Yasu (Ladj Jesu), son of his second daughter, opened a new era. In Sept., 1916, Lij Yasu was deposed, owing to his pro-Turkish sympathies. He died Nov., 1935. Meanwhile his aunt Zauditu (Zeoditu), elder daughter of Menelek, was proclaimed empress, with Ras Tafari as regent and heir to the throne. Abyssinia reverted to Cabinet Government in Aug., 1919, after over a year's personal administration by the regent.

The geographical position of Abyssinia, at the centre of the converging and conflicting interests of Great Britain, Italy, and France, was one of great political importance. The realization of this led Italy in 1923 to give strong support to Abyssinia's application for membership of the

League of Nations. Great Britain and others opposed her admission, on the ground that she was still a feudal state and could not suppress the slave trade; but she was admitted on Sept. 28, 1923, subject to certain conditions as to the control of slavery and of the arms traffic. In 1924, Ras Tafari paid a five months' visit to the principal countries of Europe. In 1928 a treaty of perpetual friendship was signed by Abyssinia and Italy, providing that all disputes between the two countries should be settled by arbitration. In the same year Ras Tafari assumed the title of king (or Negus), and on the death of Zauditu in 1930 was proclaimed emperor under the name of Haile Selassie. His spectacular coronation was attended by representatives of all the great powers. The emperor signed a new constitution in 1931, instituting two chambers of representatives, and announced that slavery was to be abolished over a period of 15-20 years. A department was created (August, 1932) to carry abolition into effect.

Italo-Abyssinian War of 1935-6
The frontiers between Abyssinia and British Somaliland, and Abyssinia and the Anglo-Egyptian Sudan, had been settled by treaties. But the boundary between Abyssinia and Italian Somaliland had never been defined, and in spite of the treaty of 1928 and the exchange in October, 1934, of notes confirming Abyssinian-Italian friendship, continual frontier incidents occurred, culminat-

ing in a clash at Walwal, a watering-place used by the wandering herdsmen of the district, towards the end of November, 1934. An Anglo-Abyssinian commission, investigating pasture lands, and escorted by Abyssinian troops, found 150 Italian native soldiers in possession of Walwal. Though Walwal was shown by every official map as being at least 50 miles inside the Abyssinian border, the Italians claimed that it was in Italian Somaliland. The commission withdrew, but the Abyssinian troops remained. On Dec. 5 the Italians brought up two tanks and three aeroplanes and drove them away. Some 60 Italians and 200 Abyssinians were killed.

Abyssinia immediately protested to the League of Nations, and appealed against alleged aggression on her territory in districts bordering both Italian Somaliland and Eritrea. Italy not only denied the allegations, but demanded compensation for her loss at Walwal and a virtual acknowledgment of Italian suzerainty. In March, 1935, Abyssinia suggested the appointment of a commission of conciliation under the treaty of 1928. Italy agreed, and a commission met in July at Scheveningen in the Netherlands, but its deliberations came to nothing.

In the meantime frontier incidents in the same region continued, and on Oct. 3 Adigrat and Adowa were bombed from Eritrea. Adigrat was occupied on the 5th, Adowa on the 6th. The Council of the League of Nations declared

unanimously on Oct. 7 that Italy had resorted to war in disregard of her covenants, and decided, with less unanimity, on coercion of the aggressor. The supply of arms to Abyssinia was sanctioned, and an embargo was placed on the supply to Italy of arms and certain key-imports (but not including petrol). A boycott of imports from Italy was declared, and all credit facilities to the Italian government were prohibited. These decisions came



Abyssinia. In 1930 Ras Tafari, decked with royal emblems, was crowned emperor under the name of Haile Selassie

into force on Nov. 18, 1935. Italy promptly retorted by banning trade with any nation that acted on the League embargo. Meanwhile she had pressed forward with the war, occupying the holy city of Aksum on Oct. 14. General de Bono, the Italian commander-in-chief, issued a proclamation on Oct. 19 abolishing slavery in occupied Abyssinia. Early in November General Graziani advanced from the S. across the Italian Somaliland frontier. At the end of the month de Bono was replaced by Badoglio. After some setbacks the Italians, with the help of aerial bombing and the use of poison gas from the air, swept on to the occupation of Neghelli (Jan. 22, 1936), Ambi Alagi (Feb. 28), Gondar (April 2), and Dessie (April 15). The emperor fled from Addis Ababa on May 1, reaching Haifa a week later in the British cruiser *Enterprise*, which had taken him off from Jibuti. Badoglio occupied the capital on May 5, the day on which Mussolini announced the end of the war and the annexation of Abyssinia. Graziani occupied Harar and Dire Dawa on May 9, the two Italian forces meeting at Dire Dawa the following day.

Mussolini announced that Abyssinia was now under the rule of king Victor Emmanuel III, who assumed the title of emperor of Ethiopia. Badoglio was appointed viceroy and governor-general. A decree of June 1 constituted the new colony of Italian East Africa by the joining together of Eritrea, Ethiopia, and Italian Somaliland. Haile Selassie made a moving address in person to the Assembly of the League of Nations on June 30, but the League took no further action on his behalf. The arms embargo against Italy was raised on July 14.



Abyssinia. Native chiefs and soldiers swearing allegiance to the emperor Haile Selassie on his restoration in 1941 *Photo, British Official*

Graziani succeeded. Badoglio (created duke of Addis Ababa) as viceroy on June 11, 1936, and was himself succeeded by the duke of Aosta on Nov. 21, 1937. Germany recognized the Italian conquest of Abyssinia on Oct. 25, 1936, and her recognition was followed at intervals by that of most of the other governments, including that of Great Britain (Nov. 16, 1938). But Italy never completely subjugated the province of Gojjam, bordering on the Sudan.

During the occupation Italy amply provided for defensive and offensive operations. A force of at least 300,000 men, with 400 guns and 200 aircraft, was on the spot, and of these some 100,000 were stationed near the Sudan borders. Her position, therefore, in view of the general weakness of the British in East Africa, seemed assured.

The Liberation of 1941

In June, 1940, shortly after Italy's declaration of war against Great Britain, Italian troops invaded the Anglo-Egyptian Sudan, British Somaliland, and Kenya. Italy also used Eritrea as the

base for naval operations on the vital Red Sea communications. These contingencies had, however, been foreseen. In the Sudan, Abyssinian refugees had been trained to be the first modern Abyssinian field force, under able British officers. In Kenya a similar but smaller force had been prepared. To aid the local contingents

South African and Indian forces were landed in Kenya and Indian forces were massed around Kassala, at Gedaref, and on the Red Sea coast, in the Sudan. There were thus two main bases for British operations against Italian East Africa. From Khartum came the forces operating against Eritrea and Northern Abyssinia. From Nairobi came those which conquered the coastal territories of Italian Somaliland and advanced north-west to Addis Ababa.

Early in July, 1940, a handful of British officers and N.C.O.s had crossed the borders of Abyssinia with an important convoy of arms. After trekking for many weeks through mountainous country and jungle they reached their headquarters some 500 miles within the borders of Ethiopia, where they undertook to train Abyssinian patriots in the use of modern firearms and to raise the standard of revolt. The Italians failed to locate the groups of patriots either on the ground or from the air, and never foresaw the growth of a hostile army.

After six months the British officer in charge of the mission was able to report to Haile Selassie that an army was trained, equipped, and ready to attack, and that the men were awaiting the presence of their emperor.

On Jan. 24, 1941, Haile Selassie crossed the border, and unfurled the standard with ceremonial and religious ritual. Drum telegraph carried the news throughout the land, and the revolt of the patriots began. Besides the two armies of the N. (patriots and Imperial troops) and south (patriots and South African troops) two other forces attacked, one from the E. and one from the S.E. The operations in Abyssinia took the form



Abyssinia. British officers with some of the troops they trained secretly before the campaign of 1941

of a great pincer movement aimed at the capture of Addis Ababa and the reduction of Amba Alagi, where the duke of Aosta was finally trapped.

The Abyssinian campaign was marked by continuous fighting and some considerable battles, particularly the great fight at Keren to secure the domination of Asmara and the coasts of Eritrea. In the final stages of the war, towns and villages were kept perpetually under artillery fire, the R.A.F. co-operating.

The duke of Aosta, as Italian C.-in-C., decided to make his last stand by withdrawing to the Abyssinian highlands in the hope that the spring rains would paralyse any advance. On April 5, 1941, the British entered Addis Ababa, a handful of men taking over a capital in which were 10,000 Italian troops and police. This was the virtual end—although Gondar (*q.v.*) held out until Nov. 27, 1941—of the Italian adventure.

An agreement was signed by the British and Ethiopian governments restoring diplomatic relations between the two countries, and providing for the services of British finance and personnel in the restoration of the emperor's

administration. The agreement was confirmed, with modifications due to progress, by the signing of a further two-year pact in Dec., 1944. The Italian decrees abolishing slavery and forced labour were maintained, and, pending the restoration in 1942 of the 1931 constitution, the emperor governed by decrees having the force of law. On Oct. 9, 1942, Abyssinia adhered to the pact of the United Nations, and on Dec. 4 of the same year she declared war on Germany, Italy, and Japan. See East African Campaign.

At the present time Abyssinia, quite apart from its economic value as a country of great potential wealth, still largely undeveloped, occupies a position of great political and strategic importance as the guardian of the head-waters of the Nile upon which the prosperity of Egypt so intimately depends.

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Acacia (Gr. *akis*, point). An extensive genus of spiny shrubs and trees of the leguminous family. They are natives of hot countries, and grow in belts on the extreme edge of deserts. The minute

flowers are gathered into crowded spikes or globular heads. The leaves are divided into many leaflets, which gives them a light, feathery appearance. In many



Acacia.
Australian Wattle

species the leaves are not developed, but, instead, the leaf-stalks are flattened and expanded to serve as true leaves. These *phylloides* always turn their edges upwards and downwards, so that they give little shade. Some species furnish

valuable drugs, gums, and tanning material.

The acacias of the greenhouse come from Australia, the East Indies and South America, and vary in height from 5 ft. to 20 ft. The flowers are yellow, white, and red. They flourish in any ordinary mixture of loam and sand in a temperature of from 50° to 65°. The mop-headed, standard, so-called acacia-tree of suburban gardens is really robinia, or false acacia, raised from seeds or cuttings in the ordinary way. The Australian wattle is an acacia, and this the Anzac troops planted on the graves of their comrades before evacuating Gallipoli in 1915.

Académie Française. Name of one of the most famous literary societies in Europe. It is the chief of the five Academies of which the Institute of France (*q.v.*) is composed. Its beginnings were very humble. In 1630 ten friends met in the house of a Calvinist named Valentin Conrart, to discuss artistic, literary, and scientific matters and questions of the day. In 1634 Richelieu heard of the society, and offered government patronage and authority. On Jan. 29, 1635, the society was declared an academy by royal edict, with Richelieu as its *protecteur* or patron.

By 1637 the number of members had been fixed at 40 (known as the Immortals), a limit since strictly maintained. Richelieu was succeeded in the protectorate by Chancellor Séguier, and in 1672 Louis XIV undertook the office, his example being followed by his two successors. During the revolutionary period its property was confiscated. On March 21, 1916, the Academy, which had been reconstituted in



Académie Française. M. André Maurois, wearing a silver and ivory sword of honour presented to him by French and English admirers, is seen addressing his fellow members on being elected in 1938 to this famous institution

1795 as one of the four classes (now academies) of the National Institute, was authorized to "resume its old name and regulations." Since then its history has been uneventful. The chief aim of the Academy is to safeguard the purity of the French language. Its first work was a criticism of the *Cid* of Corneille (1637). In the same year it undertook the compilation of a definitive French dictionary. This was published in 1694 and has since been under constant revision. In its eighth edition it is the stand-by of all modern French authors. The Academy remains a dominant literary influence, and its awards are coveted distinctions.

Académie Goncourt. French literary society. Founded by Edmond de Goncourt in 1896, its purpose is to foster the work of young authors. There are 10 members, chosen from the members of the Académie Française, to which de Goncourt himself belonged. An annual prize is awarded for the year's best novel.

Académie Nationale de Musique. Title by which the Opéra in Paris is officially known. Founded in 1669 by Louis XIV, this great institution has had many famous directors, including Gluck, Rameau, Rossini, Meyerbeer, Gounod, Saint-Saëns, and Massenet. It is housed in one of the most imposing buildings of its kind, dating from 1875. The Conservatoire de Musique was opened in 1784 as a training ground for the Opéra; but it has since extended its range, which now includes every kind of musical training.

Academy (Gr. *akademeia*). Originally the name of a public park and gymnasium N.W. of Athens, named after its supposed former owner, the hero Academus. In its olive groves Plato taught for nearly 50 years, and after his death it remained the haunt of Greek scholars until Justinian closed the old pagan schools in A.D. 529. Phases in the interpretation of the Platonic doctrines have been named the Old, the Middle, and the New Academies.

The term is now most exactly used in reference to any society for the disinterested pursuit of one or more of the arts and sciences. In this modern sense the earliest academy was the Museum at Alexandria founded by Ptolemy Soter during the 3rd century B.C. Here the finest scholars came from Greece and from the East, all the known arts and sciences were taught, and a great library came

into being. The Jews, and later the Arabs, took it as model for their own learned institutions. Alcuin formed a similar establishment for Charlemagne at S. Martin's, Tours, in A.D. 796. Belgium is said to have had an academy in the 12th century, and the Academy of Floral Games, founded at Toulouse in connexion with the Troubadours, has continued in existence to modern times. But it was in Italy, during the Renaissance period, that the academy, as an association of learned men, attained to fuller development. Under Cosimo de' Medici (1389-1464) was founded the Platonic Academy, the chief representative of which was Marsilius Ficinus; other academies were associated with the names of Laurentius Valla

portant include the Royal Society (1662), the Royal Institution (1799), the British Association for the advancement of science (1831), the Royal Academy of Arts, the British Academy for the promotion of historical, philosophical, and philological studies, the Royal Geographical Society (1830), the Royal Historical Society (1868), and the Society of Antiquaries (1751).

IRELAND. The Dublin Royal Society (1750); the Royal Irish Academy (1752); the Royal Hibernian Society (1803).

FRANCE. In addition to the five academies that compose the Institute of France, there are the Académie de Médecine (1820), the National Society of French Antiquaries (formerly the Celtic Academy, founded 1805), and academies in leading provincial cities.

BELGIUM. The Royal Academy of Science, Letters, and Fine Arts, Brussels (1773).

HOLLAND. The Royal Netherlands Institute of Sciences, Amsterdam (1808), and learned societies at Rotterdam, Utrecht, Haarlem, and Middelburg.

PORTUGAL. The Royal Academy of Sciences (1779).

SPAIN. The Royal Spanish Academy, founded in 1713



Academy. Plato's academy derived its name from the grove of Academus, near Athens. This mosaic is believed to represent the philosopher teaching in his shady retreat
Mosaic from Pompeii; Nat. Mus., Naples

(Academy of Naples) and Pomponius Laetus (Academy of Rome). The Accademia della Crusca set the standard of the modern written language of Italy. Another early Italian academy was the Accademia del Cimento, founded in 1657 with the object of carrying on scientific experiments.

Below is a list of the leading academy or similar institutions in different countries:

GREAT BRITAIN. The number of societies and associations devoted to various branches of learning in Great Britain, the Dominions, and the Colonies is very large. A list is given in the Year Book of Scientific and Learned Societies. The most im-

portant for the study and preservation of the Castilian language.

SCANDINAVIA. The Royal Danish Academy of Sciences, Copenhagen (1742); the Royal Society of Sciences, Trondhjem (1760); the Royal Swedish Academy of Sciences (founded, 1739, by Höpken and Linnaeus); the Academy of Uppsala for the study of Scandinavian languages (1720); the Societas Scientiarum, Helsinki (1838).

RUSSIA. The Academy of Leningrad, formerly the Imperial Academy of Sciences, founded by Catherine the Great in 1728.

ITALY. The Royal Academy of Sciences, Turin (1750), and similar academies in other principal

cities; the Accademia Ercolane, founded in 1755 to deal with antiquities discovered at Herculaneum: the Pontifical Academy, reconstituted in 1936 by Pius XI. Academies of the fine arts are at Turin, Milan, Florence, Mantua, Naples, Venice, and Palermo. The last two cities also have medical academies.

GERMANY. The Academia Naturae Curiosorum (academy of those curious about nature), founded 1662 and later known as the Academia Leopoldina; and the Prussian Academy of Sciences, Berlin (founded, 1700, by Frederick I).

HUNGARY. The Academy of Sciences, Budapest.

In Czechoslovakia, Prague has a famous academy. In Rumania, Yugoslavia, and Bulgaria there are academies and learned societies at Bukarest, Belgrade, Zagreb, and Sofia.

In the East there are at least two institutions which should be mentioned: the Union of Sciences, founded at Constantinople, now Istanbul, in 1851, and the Egyptian Institute at Alexandria (1859), which has issued various reports of considerable interest.

UNITED STATES. The first example of a modern academy was the American Philosophical Society, founded in 1743 by Benjamin Franklin, who was its president every year until his death. Other similar institutions are the American Academy of Arts and Sciences (1780); the Philadelphian Academy of Natural Science (1812), the American Academy of Political and Social Science (1886); the Washington National Academy of Sciences (1898). Perhaps the most remarkable institution of its kind is the Smithsonian Institution, founded in 1846 with money left by the Englishman James Smithson, which has been responsible for the production of numerous important works on mathematical, physical, historical, and economic subjects. See British Academy; Royal Society; Royal Academy of Arts; Académie Française; Accademia della Crusca; Smithsonian Institution.

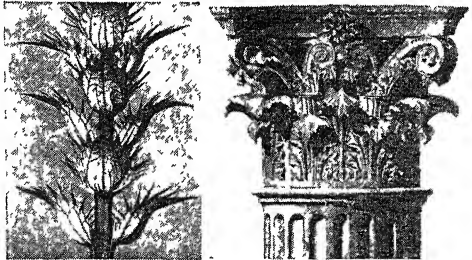
Acadia or **ACADIE.** Name by which Nova Scotia was officially known by the French before

1713. The name was given by the early French settlers, many of whom, after the final cession of the province to the English in 1713, migrated to Canada or were exiled in circumstances which inspired Longfellow's poem *Evangeline*.

Acadia University. Baptist educational institution at Wolfville, Nova Scotia. Incorporated as a university in 1838, it is still largely denominational and has about 300 students.

Acajutla. Port of Salvador, Central America. On the Pacific, 65 m. by rly. S.W. of San Salvador, it exports coffee and sugar.

Acanthus (Gr. *akantha*, prickle). Genus of herbs with bold, handsome foliage. The large leaves proceed from the root-stock, and are cut up into numerous lobes, with their edges bearing sharp teeth or stiff spines. The irregular flowers have a single lip, and are borne in tall spikes. They are mostly natives of S. Europe, the best known being *Acanthus mollis*, with soft teeth, and *A. spinosus* (bear's breech), with stiff prickles. Both species are frequently cultivated as foliage plants. *Acanthus spinosus* is said to have furnished the Greeks with the



Acanthus. Left, leaves of *A. spinosus*, said to have been used by the Greek sculptor Callimachus (5th cent. B.C.) for the capitals of his new Corinthian column (right)

idea for the capital of the Corinthian column, an idea elaborated in Roman art and architecture more on the lines of the richer and more ornamental *Acanthus mollis*.

A Cappella. In church music, a style, either for unaccompanied voices, or with the organ merely playing the voice parts.

Acapulco. Seaport of Guerrero, Mexico. Situated 230 m. S.W. of Mexico city, it possesses the best harbour on the Pacific coast of Mexico, and is a port of call for vessels trading between San Francisco and South American ports. Mountainous country immediately inland has made communications difficult, but in 1927 the old road between Acapulco and Mexico city was reopened as a modern motor road.

The Abra de San Nicolas, an artificial opening or cut through the mts., modified the natural insalubrity of the landlocked harbour. Violent earthquakes were experienced in 1909. Exports include hides, timber, and fruit. Pop. 6,000.

Acaracu. Coast town of Ceará, Brazil. At the mouth of the river Acaracu, it is 133 m. N.W. of Fortaleza, has a small harbour, and exports maize, cotton, and salted fish. Pop. 20,000.

Acarmania. District of ancient Greece, and part of the modern Greek nome or prov. of Acarnania and Aetolia. Mountainous and thickly wooded, with an indented coastline, it is separated from Aetolia by the river Aspropotamo (white river), formerly Achelous. The Acarnanians, warlike and addicted to piracy, lent valuable aid to the Athenians in the Peloponnesian war. Under the Romans Acarnania formed part of the prov. of Achaea or of Epirus. The walls of Stratus, the old capital, are still recognizable. The area of Acarnania, with Aetolia, is 3,013 sq. m. Pop. 255,862.

Acarus (Gr. *akari*, mite). Genus of minute parasitic animals belonging to a division of the Arachnids. They include the itch and mange mites, the harvest mite which causes heat lumps in autumn, the follicle mite common in the hair, and the cheese mite.

Acarus scabiei is a species of human parasite, the female of which produces the condition known as scabies or itch. It is not visible to the naked eye, but under the microscope is seen to have a flat roundish body with eight legs, to the four anterior of which are attached suckers, and to the posterior set bristles. It burrows into the skin, where it lays its eggs, causing severe irritation, which is made worse by inflammation set up by constant scratching. The condition is readily cured by appropriate ointments. The male, which is smaller, lives on the surface of the skin and takes no part in causing the symptoms. Itch is most frequent in people of dirty habits, but may occur in cleanly people if the parasite happens to find a lodgment on the skin. *Acarus folliculorum* is a minute and unimportant parasite found in the sebaceous glands of the face and body.

Acatalectic Verse (Gr. *a*, not; *katalektikos*, stopping). In prosody, a verse which has the complete number of syllables belonging to the measure.

Accademia della Crusca. Italian learned society. The word *crusca* means chaff or bran, the idea being that the work of the academy was to separate good literary work from bad. It was founded at Florence in 1582; in 1612 the academy issued a dictionary which set the standard of the written language of Italy. The name Della Crusca was adopted in the 18th century by a school of affected sentimental English versifiers ridiculed by Byron and Gifford.

Acceleration (Lat. *accelerare*, to hasten). Word used in its most general sense to indicate any change in velocity. Hence it may mean an increase or a decrease in the speed, or a change in the direction of motion. Commonly, however, acceleration is employed to denote a change in speed only. It may be uniform, in which case equal changes of speed occur in equal times, or it may be variable. If the speed is increasing, then the acceleration is positive; if decreasing, negative. Therefore negative acceleration is what is ordinarily called retardation. Uniform acceleration is measured by the change in speed taking place in a given time when divided by that time. The formula is thus $a = (v_2 - v_1)/t$ where v_2 and v_1 are the respective velocities, a the acceleration, and t the time. Variable acceleration is measured by dividing the change in velocity occurring in an interval so small that the acceleration does not appreciably change in it, by the time. See Dynamics; Motion, Laws of.

Accent (Lat. *ad*, to; *cantus*, singing). Prominence given to the particular syllable of a word in pronunciation. There are two chief kinds of accent, pitch (musical, tone) accent, and stress (emphatic) accent. The latter predominates in modern European languages, and frequently indicates quite a different meaning or shade of meaning, as in *conduct*, *conduct*; German *umstellen*, surround, *umstellen*, transpose. On the other hand, Chinese essentially employs the pitch accent. The terms acute (rising), grave (falling), circumflex (bent round, rising and falling) are derived from the Greek system of accentuation, attributed to Aristophanes of Byzantium (200 B.C.). See Phonetics.

In music, accent is (1) a regularly recurring stress on certain notes; (2) a special stress on notes not normally accented, indicated by > , *sf*, *fz*, and other signs of emphasis.

Accentor (Lat. *ad*, to; *cantor*, singer). Name given to a subfamily of small birds, probably

related to the thrushes. They have rather soft beaks, brownish plumage, and square tails. They occur in Europe, N. Africa, and parts of Asia, and are usually found in thickets and hedges in hilly districts.



Accentor or British hedge sparrow

The group is represented in Great Britain by the familiar hedge sparrow, which is no relation of the house sparrow. Its plumage is dusky brown, with a reddish back and bluish-grey head and neck. It is often mottled with white; and pure white specimens are occasionally seen. It nests early in the spring in hedges, usually near human habitations, and frequents gardens in the winter. The eggs are blue without spots. The Alpine accentor is larger, and has a white throat spotted with black. It lives among the mountains of Europe, and occasionally visits the British Isles.

Accents. Marks used to indicate stress in pronunciation. Those now most commonly used, e.g. in French, are the old classical accents, the grave or heavy ('), the acute or sharp (') and the circumflex, a combination of both (^). In French the use of the circumflex generally indicates the dropping out of a consonant before another consonant, e.g. *bête* for *beste*, *âme* for *anme* (Latin *anima*). Although strictly speaking not accents, mention may be made of certain other marks called diacritical which serve as guides to pronunciation. The cedilla (,) is placed under c, chiefly in French and Portuguese, when the letter is to be sounded like s, not like k. In English the diaeresis (''), from Greek *diairein*, to divide, is placed over the second of two vowels to show that each vowel is to be pronounced separately, and the grave or acute accent is occasionally used in poetry over the e in *ed* to show that it has to be pronounced as a separate syllable, e.g. *learnèd*. In Spanish the tilde (~) and in Polish ' are placed over n (*ñ*, *ń*) to indicate the y-sound heard in *poniard* (*cañon*, *Poznań*). In the Teutonic and Scandinavian languages modifications in the sound of the vowels are expressed by certain marks (*Äbo*, *Götter*). Diacritical marks are used in certain Oriental languages.

Acceptance (Lat. *accipere*, to receive). In commerce, the completion of a transaction over a bill

of exchange. The person who accepts such a bill does so by putting his signature and the word "accepted" across the face of the document, although by English law the signature alone is sufficient. In English law an acceptance may be either general or qualified. A qualified acceptance varies as to time and place of payment, etc., according to the conditions stated in the bill. A bill may be accepted after it has been dishonoured. See Bill of Exchange.

Acceptilation (Lat. *acceptilatio*, reckoning a thing as received). In Roman law, complete legal discharge from all liability. In Scots law it is not necessary that an obligation should be based on valuable consideration, as in English law. In English law, before a contract or obligation is binding there must be consideration—i.e. something to be done or forborne. In Scotland the doctrine of consideration is rejected and an obligation is binding that is undertaken gratuitously and without consideration.

Access, RIGHT OF. In the British Parliament, the privilege of direct intercourse with the sovereign is still formally claimed by the Speaker as one of the "ancient and undoubted rights and privileges" of the Commons. It is a relic of the time when the King took a much more direct part in the government of the country than he does to-day. Then his refusal to hear a man, or still more to hear a petition of the Commons, might have caused serious difficulties; hence steps were taken to keep the right alive. Right of access is only enjoyed by the House of Commons collectively, i.e. through their Speaker, but peers and privy councillors have an individual right of access to the sovereign. See Commons, House of.

Accession (Lat. *ad*, to; *cedere*, to come). In Great Britain and other monarchical countries the act of acceding to the throne: to be distinguished from the coronation, which usually takes place some months later. In Britain the formality of an election has been abandoned since the time of Edward I, and a king succeeds immediately his predecessor is dead. On his accession, at a meeting of the privy council, the new sovereign takes an oath to govern according to the laws of the land and is then proclaimed.

Accession. In law, a mode of acquiring ownership in property. It is the addition by nature or labour to something already owned. The principal thing carries ownership in the things that

attach to it or grow out of it. The ownership of animals carries with it the ownership of the young. The ownership of trees and plants taking root in the ground belongs to the owner of the land, though they were planted by another. This mode of ownership applies chiefly to land gained from the sea or river. An island rising in a river belongs to the owners of the banks of the river. In foreshores, in the event of the sea receding, the new land by the doctrine of accession belongs to the owner of the adjoining land. But the ownership of property is not changed by sudden or temporary inundation. If the sea suddenly recedes, the land gained belongs to the Crown.

Accessory. Term used in criminal law to denote that while a person may not have taken a principal part in the commission of an offence, yet he has incurred some degree of criminal responsibility. Accessories are of two kinds: accessory before the fact and accessory after the fact. An accessory before the fact is one who, though absent at the time the offence was committed, yet procured, counselled, or abetted another to do it. An accessory after the fact is one who, knowing that a felony has been committed, relieves, receives, comforts, or assists the felon so that he shall escape from justice.

In treasons and misdemeanours there are no accessories. All are principals in the offence. If the party is actually or constructively present at the commission of the offence, he aids and abets and must be so charged. Concealment of the fact that another intends to commit a felony will not amount to crime, nor will a passive acquiescence or words that amount to bare permission be sufficient. An accessory is liable for all results from his unlawful command. If he orders A to assault B and A kills B, he is accessory to murder.

Accidence (Lat. *accidere*, to happen). That part of grammar which treats of the accidents (inflections) of words, or the changes of form in nouns and verbs which indicate a difference of relation to someone or something else. While some languages, e.g. Greek and Latin, are rich in inflections, English has preserved only few traces of them.

Accident. In English law there is no definition of an accident. Apart from the Workmen's Compensation Act of 1925 the word is generally used in actions for negligence, where the defendant can

succeed if he proves that the injury was caused by inevitable accident; that is, by something which was neither his fault nor the plaintiff's, but a state of things no reasonable man could foresee or avoid. In connexion with Workmen's Compensation claims the decisions remained very unsatisfactory until 1903, when the case of *Fenton v. Thorley & Co.* was decided. The Court of Appeal had held that accident involved the idea of something fortuitous and unexpected, and therefore something like a fall or blow that was unexpected was essential to constitute an accident. If a man took a risk, and the chance went against him, and he was hurt, it was no accident; nor was it an accident if he were injured by the wilful or negligent act of another.

In the House of Lords this decision of the Court of Appeal was reversed, and Lord Macnaghten in his judgement defined what it is that constitutes the essentials of an accident. "The expression is used in the popular and ordinary sense of the word as denoting an unlooked-for mishap or untoward event which is not expected or designed." Thus, if one is run over in the street by a car, it is an accident (as it would be in popular language), although the driver drove negligently, or even ran one down on purpose. In *Nesbet v. Rayne and Burn*, 1910, it was held that the death of a workman who was intentionally shot with a view to robbery was caused by an accident. It is now settled that injury by accident means any injury not expected or designed by the workman, whether it was brought about by the wrongful act of another person, or not. Disease may, therefore, be an injury by accident.

The National Insurance (Industrial Injuries) Act, 1946, removed the whole question of workmen's compensation from the courts, and transferred it to the ministry of National Insurance.

Accident. In logic, a non-essential quality of a person or thing. Ink, whether black or red, is still ink; a man, virtuous or vicious, is a man. Blackness, redness, virtue, vice, are accidents.

Accidental. In music, a sign for temporarily raising or lowering a note, and altering the pitch by sharp, flat, or natural.

Accidents. These may be divided into general and industrial. The former are due largely to vehicular traffic. Road accidents in Great Britain in-

creased steadily to a peak figure in 1941 of 9,169 killed; then a decline occurred and in 1943 there were 122,536 casualties of which 5,796 were fatal. As wartime black-out rules probably affected totals for the worse, and the disappearance of many cars from the road for the better, the figures for the last full year of peace, 1938, are more representative: 233,359 casualties, of which 6,648 were fatal. In 1943 there were 768 persons killed and 2,983 seriously injured on the railways. Responsibility for reducing accidents as far as possible rests on the Ministry of Transport and the police. The Minister holds inquiries into all considerable accidents caused by public vehicles, and in the years before the Second Great War promoted measures to make road travel safer: speed limits, multiple tracks, pedestrian crossings, traffic lights, roundabouts. Drivers of cars are compulsorily insured against third-party risk. If negligence on the part of a company or corporation or individual can be proved, sufferers can obtain compensation. Insurance against railway accidents is obtainable for a few shillings on a journey, as well as by policies from insurance companies.

Industrial accidents are those which happen in the course of one's occupation. In the United Kingdom in 1938 they numbered 442,787, of which 2,492 were fatal. The largest group were mining accidents (983 killed, 162,097 injured), followed by those in factories (735 killed, 219,907 injured). Reportable accidents in factories had risen by 1942 to 314,630, of which 1,363 were fatal. The duty of reducing their number as far as possible rests on the Ministry of Labour, which acts through a staff of inspectors. Details of accidents having been reported, consideration of them may lead to preventive legislation. Law and invention have both contributed to the greater safety of industrial workers. Persons injured at employment have hitherto been provided for by the Workmen's Compensation Act, 1925, the Supplementary Allowances Act, 1940, and the Temporary Increases Act, 1943. After a fatal accident a dependent survivor with children could receive a maximum of £700; the victim of a non-fatal accident could receive 40s. weekly, or 50s. after 13 weeks, with 5s. extra for each child under 15 years. According to the Government measure of

1946, Workmen's Compensation is regarded not as part of employers' liability but as a social service. Benefits are paid by the state according to the degree of disablement, the period of incapacity, and the number of dependents. Insurance policies against industrial accidents are obtainable from the chief companies. Much scientific research has been undertaken into the physical and psychological factors tending towards individual "accident-proneness." The first international conference for the prevention of industrial accidents was held at Milan in 1912.

Acclamation (Lat. *ad*, to; *clamare*, to shout). Shout of approval by a public assembly of any kind. Acclamations were prominent features in the public life of Rome. They were given to actors and authors, were raised at weddings, and even at funerals, while occasionally preachers received them. Emperors and victorious generals were acclaimed on great occasions. At first an acclamation might be favourable or unfavourable; gradually the word became restricted to the former sense.

Acclimatisation (Fr. *à*, to; *climat*, climate). Term for the adaptation of people, animals, plants, or trees to a new environment, particularly with reference to climate. Applied to an individual or a race, it has special significance with reference to disease. In the case of an individual it means that a person has acquired the power of absolutely or partially resisting agencies which otherwise would be injurious to his existence. This power may result from recovery from a particular infectious disease. It may also mean that as the result of subtle change in his whole body he has gradually adapted himself to the general conditions of life in a new environment.

Applied to an entire race, acclimatisation is a form of protective evolution, and implies that the race has acquired an increased power of resisting infectious diseases, or else has acquired a greater capacity for recovering from them. The greater acclimatisation of a race to new surroundings or new agencies is a question of evolution, principally by means of the factor of the survival of the fittest. Both individuals and races must undergo acclimatisation in new environments if they are to survive. Thus, a person born in Great Britain is apt to find the climate of the West Coast of Africa unhealthy, and he must become used to it, that is,

acclimatised, either by gradual absorption of protecting toxins into his system, or by recovery from the disease peculiar to the country. In the same way, the West African negro requires to be acclimatised to the climate of Great Britain. In the absence of such a protecting process survival is impossible where the agencies are at all deadly. All races which have dwelt long in one environment exhibit great resisting power to its dangers.

In animals and plants acclimatisation depends in general on two factors, food and enemies. Some races of animals, including types of the horse, have survived because they have been able to accommodate their digestive apparatus to the food found in their

killed by unsuitable temperatures. The rabbit, the fox, the sparrow, thrushes and starlings, and even English earthworms, introduced into Australia, found plenty of food there and an absence of their natural enemies, and have acclimatised themselves so completely as to evict native species by beating them in the competition for sustenance. In general birds acclimatise themselves better than mammals.

In the acclimatisation of plants somewhat similar considerations apply, though plants, having no temperature of their own, are more susceptible to environment. But the prickly pear, a solitary specimen of which was introduced into Australia, has acclimatised itself so thoroughly, in the absence of its plant enemies, that it spreads over millions of acres. The English briar rose is spreading nearly as fast. The lantana, known as the "curse of Mauritius," is a weed that has prospered with disastrous results in Africa, Australia, Asia, and America. On the other hand, such climatically indigenous plants as rice, cotton, tea, tapioca, cannot be acclimatised beyond distinct geographical limits; but probably a great number of plants, of which the eucalyptus is a typical example, accommodate themselves to the climatic variations by selection and adaptation of their own characteristics.

Accolade (Lat. *ad*, to; *collum*, neck). Act of conferring knighthood by gently striking on the shoulder with a naked sword. It is performed either by a sovereign prince or by a knight holding authority from such a prince.

Accollé. Heraldic term for two shields placed side by side and touching each other. One bears the husband's arms and the other those of his wife, or one bears paternal arms and the other insignia of office.

Accommodation. Term in English law, generally applied to a bill of exchange or promissory note which is executed by the parties thereto, so as to enable one or all of them to discount it, and so raise money. It is colloquially called flying a kite. A bill of exchange drawn by A upon B and accepted by B ought to mean that B owes A money, and the bill is a document whereby B pledges himself to pay that money. But in the case of an accommodation bill, A draws a bill for (say) £100 on B; B writes across it "accepted," and signs it. A then takes the document to a bill discounter, or a bank, and, on the strength of B's acknowledgment of indebtedness and promise to pay, discounts



Accolade. King George VI giving the accolade to Gen. Sir Oliver Leese

environment. Other animals are presumed to have died out because the food they could find was unsuitable or because they were starved out in the struggle for food by competing races. Among the ranks of enemies the most potent appear to be parasites and micro-organisms, which, by causing diseases, may sweep a species out of a country or even a continent. It is supposed that the disappearance of the primitive horse from North America was thus brought about in the carboniferous period. Other factors are climatic temperature and habit. The yak cannot be acclimatised away from its mountains; reptiles, especially snakes, are extremely susceptible to low temperatures; and many insects, including the malarial mosquito and the plague flea, are

the bill for ready money—generally the full £100 less 5 per cent. or thereabouts. When the bill becomes due the holder can claim the £100 against B or A. It is a device to raise money by pledging one's credit. As between A and B, if B pays the £100 to the holder, and A has had the money for the discount, A must indemnify B. The word accommodation is also used in a wider sense, meaning to lend money generally, for instance the accommodation afforded by a banker to a customer.

Accommodation (Lat. *accommodare*, to fit to). Term used in theology and Biblical exegesis. It means that a statement of truth is modified to make it better understood. Some of the parables of Christ and many utterances of the prophets afford instances.

Accommodation. As applied to vision, the process or the power of focusing the eyes to enable objects to be seen at different distances. The adjustment is effected by alterations in the convexity of the crystalline lens behind the pupil, through which rays of light pass to the retina. *See* Eye.

Accompaniment. Music of a subordinate nature played or sung to enrich and support solo voices or instruments. When an accompaniment ceases to be subordinate to the solo part or parts, the music should be described as a duet, trio, quartet, etc. *See* Obbligato.

Accomplice (Lat. *ad*, to; *cum*, with; *plicare*, to weave). One who assists another in the commission of a crime. An accomplice may be an aider and abettor or an accessory. The evidence of accomplices is always admissible against a prisoner, but the judge should advise the jury that it is dangerous to convict on such evidence if not corroborated. The evidence of other accomplices is not corroboration, and evidence offered as corroboration need not prove that the prisoner committed the crime. It is enough if it connects him with it circumstantially. The older form of the word is complice. *See* Accessory.

Accord and Satisfaction. Term used in English law. Where a cause of action exists, and the parties agree that something shall be paid, or given, or done, in satisfaction thereof, and that something is paid, given, or done, the original cause of action has gone, because there is accord and satisfaction. Thus, if X owes Y £100, and Y agrees to accept X's car in lieu thereof, there is accord ;

and if the car is handed over by X there is accord and satisfaction, and the £100 is no longer due. There can be no accord and satisfaction of a larger sum by payment of a smaller one. Thus, if A owes B £100, and B agrees to accept £50, B can still sue for the other £50. But if the £100 is due on a day, and B agrees to accept, and is paid, £50 the day before, then there is accord and satisfaction.

Accordion (late Lat. *accordare*, to agree). Portable reed instrument with bellows and button keys. To save weight and space, each key usually sounds two notes with the alternating action of the bellows. A Viennese invention, it dates from 1829. The piano-acordion, with keyboard in place of buttons, was introduced in Paris, 1852, and became highly popular in many countries from about 1920.

Accosted (Lat. *ad*, to; *costa*, side). In heraldry, a charge or device when placed between two others : or two animated creatures placed side by side.

Account (Lat. *ad*, to; *computare*, to reckon). In English law a settled account is a statement of accounts between two parties which is agreed to and accepted by both as correct. An action by the creditor will lie on this on "an account stated." An action for an account may be brought by anyone who alleges that another owes him money on dealings between them which have resulted in indebtedness by the defendant to the plaintiff; and in such an action the defendant will, on a *prima facie* case being made out, be compelled to disclose all dealings. For example, if A has agreed to pay a commission to B on all orders given by customers introduced by B to A, B can bring an action for an account of the orders given and their amount. Such actions are almost invariably tried by an official referee, or by a master in chambers.

Accountancy. The keeping, directing, and examining of accounts, as practised by professional accountants. The first traces of the professional keeping of accounts are to be found in Italy. The very complete fabric of state accounting constructed by the Romans was, after the Roman Empire, eventually revived by the communes and free cities therein. Records of the 12th century are known, but it was not until 1581 that the first association of accountants was founded—in Venice. Within 100 years this had

become so important that only its members could act in that state as accountants in connexion with law or public administration.

A college was established in Milan in 1739, approved by the Senate in 1741, and opened in 1745, and a statute of 1744 decided that to obtain membership the candidate should have a knowledge of Latin, commerce, public affairs, economics, and arithmetic, serve a five years' apprenticeship, pass an examination in the science of accounting, and be 25 years of age. Finally, after repeated requests, the state of Milan agreed to appoint to public offices only accountants whose acquirements could be attested by the college. Later in the century the college was dissolved.

The profession encountered many vicissitudes, but in 1879 a congress held at Rome recommended the formation of associations or colleges of accountants in each province of Italy. This was carried out, some of the colleges growing out of earlier societies in certain towns. By royal decrees in 1885 and 1891 the sphere of accountants in Italy was defined, and latterly the northern half of that country, where the great commercial centres are situated, has been a fertile field for the exercise of the profession.

In the United Kingdom

The initial growth of the profession in the United Kingdom is undoubtedly first traceable in Scotland. In 1773 seven accountants were mentioned in the Directory of Edinburgh as practising in that town, and in 1783 the Directory of Glasgow mentioned six accountants. In 1853 steps were taken in Edinburgh to form a closed body. The Institute of Accountants resulted, and this obtained a royal charter in 1854. A similar royal charter was obtained by the Glasgow Institute of Accountants in 1855, and later Aberdeen followed suit. The three bodies began in 1896 the issue of a directory of Scottish chartered accountants. Admission to any of these societies can be obtained only after service under articles, after passing three examinations and attendance at certain university classes.

The first records of practising accountants in England appear about the same time as those in Scotland, as five names are reported in the British Universal Directory of 1790, but it was not until 1870 that steps were taken

to organize the profession. Then a society was formed at Liverpool, soon followed by the Institute of Accountants in London, and in 1871 by a society at Manchester. The Society of Accountants in England was formed in 1873, and in 1880 the existing societies were incorporated by royal charter into the Institute of Chartered Accountants of England and Wales.

In 1885 the Society of Incorporated Accountants and Auditors was formed, and in 1891 the Corporation of Accountants in Glasgow. The latter body, with the Institution of Certified Public Accountants (1903) and the London Association of Certified Accountants (1905), now constitutes the Association of Certified and Corporate Accountants. In Ireland a Chartered Institute was formed in 1888, and a Society of Accountants and Auditors in 1900. Other organizations in the U.K. include the Institute of Company Accountants, the Institute of Cost and Works Accountants, the Institute of Municipal Treasurers and Accountants, and the Association of International Accountants. The movement towards organization, initiated in the British Isles, has since spread throughout the British overseas dominions.

The profession does not seem to have developed in the U.S.A. until much later. Its work there is mostly confined to audits and investigations, and differs from that of the United Kingdom in that its members may advertise freely.

New Openings

Accountants have become more numerous of recent years, but the demand has fully kept up with the supply. The Companies and Bankruptcy Acts have provided profitable openings for accountants as liquidators and trustees. Large firms and companies resort more and more to qualified accountants as the heads of their accounts branches. Manufacturers look to them for their costing, etc. The income tax laws require expert knowledge, and with the high rate of tax now in force numbers of people are calling in skilled accountants. This is an age of specialization, and the "figure-specialist," if he can be so called, is a natural outcome of this tendency, and is supplying a demand that is unlikely ever to cease through excessive supply.

Accountants' charges vary. It is usual to agree a sum for, say, an audit, and not to pay directly according to the time employed.

For trustee and liquidation work there is a scale percentage of remuneration.

To become a member of the Institute of Chartered Accountants in England and Wales the beginner must first pass the preliminary examination, or be exempted from it on the ground of holding a certificate of equal standard. Provided he is sixteen years of age, he must then enter into articles of clerkship for five years with a member of the institute in practice in England or Wales. For university graduates the period is only three years. After the expiry of one-half of the term of service the articulated clerk can sit for the intermediate examination, which is held in the following subjects: (1) book-keeping and accounts, including limited companies, partnership, and executorship; (2) auditing; (3) general commercial knowledge. After a further two years he can present himself for the final examination, conducted in the following subjects: (1) and (2) as in the intermediate examination, but on a higher standard; (3) general financial knowledge; (4) company law; (5) law relative to bankruptcy, deeds of arrangement, etc.; (6) mercantile law and law of arbitration and awards. Membership of the institute is divided into two classes, fellows and associates (F.C.A. and A.C.A.).

A person may also become entitled to the designation of Chartered Accountant by acquiring membership of one of the Scottish chartered bodies or of the Institute of Chartered Accountants in Ireland. The necessary preliminaries are much the same.

Incorporated Accountants

To become a member of the Society of Incorporated Accountants and Auditors, a preliminary (or educational) examination or one of similar standard must first be passed; then articles of five years' service must be entered into, except in certain cases referred to below. At the expiry of two years the articulated clerk can take the intermediate examination, and in his last year the final examination. The subjects of both examinations are similar to those of the Chartered Institute.

Service under articles is not insisted upon in the case of accountant's clerks with nine years' continuous service. They must first pass or obtain exemption from the preliminary examination. They may be allowed to sit for

the intermediate after six years' experience, if not less than 22 years of age, and then for the final after nine years' experience, if not less than 25 years of age. This is a valuable concession, and has been much appreciated by those qualified; it has also been the means of securing many able and highly-skilled accountants.

Fellows are entitled to the letters F.S.A.A. after their names, and associates A.S.A.A. The professional designation is Incorporated Accountant. An associate may be elected to fellowship after completing three years in public practice.

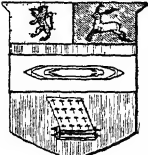
Service under articles is not insisted upon by the Association of Certified and Corporate Accountants. The Association holds three examinations, viz., preliminary, intermediate, and final. Exemption from the preliminary examination may be obtained by those who have secured matriculation or school certificate, or have passed other examinations of equivalent standard. The examinations are similar in subject and scope to those of the other two bodies. The passing of these examinations does not of itself qualify for membership of the Association; a minimum of five years' sound practical accountancy experience is required in addition. The designation of members is Certified Accountant. There are two classes of members, fellows (F.L.A.A.) and associates (A.L.A.A.).

See Bankruptcy; Book-keeping; Company Law.

ACCRA or **AKKRA**. Seaport and, since 1876, capital of British Gold Coast Colony, 80 m. E. of Cape Coast. It has rly. communication with Takoradi harbour, the line running 365 m. via Kumasi, in Ashanti. A municipality, Accra is an air, telegraph, and wireless station, and has a lighthouse, banks, Anglican church, and race-course. Achimota College (1927) is the principal educational institution of the Gold Coast. There is no harbour, and landing is by surf-boats. It exports cocoa, gold dust, palm oil, ivory, rubber, gum, and timber. Pop. 72,977.

ACCRETION (Lat. *ad*, to; *crecere*, to grow). In general, a term meaning growth or formation by external additions. It is used in medicine, geology, etc.; in law, where land is formed gradually and imperceptibly by the action of water it belongs, or accrues, to the owner of the adjacent soil.

Accrington. Municipal and parl. borough and market town of Lancashire, England. On the river



Accrington arms

Hindburn, 23 m. N.W. of Manchester by railway, it is an important cotton-spinning centre, with cotton-weaving, bleaching, cotton-printing, and dye-works, and manufactures chemicals and textile machinery; also carpet sweepers, mangles, and washing machines. There are quarries and collieries in and near the town. S. James's Church, rebuilt in 1763, dates from 1554, but the police station, fire station, law courts, and other buildings are modern. First mentioned in Henry II's reign, Accrington developed with the railway and the Lancashire coalfield in the middle years of the 19th century, and was granted a charter of incorporation

in 1878. Formerly giving its name to a county division, it was created a parl. borough under the Representation Act, 1918, and now returns one member to Parliament. Market days, Tues., Fri., Sat. Pop. about 40,000.

Accumulation (Lat. *ad*, to; *cum*ulare, to heap up). Term used in English law. By the Thellusson Act (1800) restrictions were placed on the accumulation of the income of property in the hands of trustees. A testator or settlor can direct the accumulation of the income of property only for one of the following periods: (1) the life of the settlor; (2) 21 years after his death; (3) the minority of any person or persons living at the settlor's death; or (4) the minority of any person who, if of full age, would be entitled to the income. Any excess over these periods is, with a few exceptions, void. The Thellusson Act is so called because it was a consequence of the will of Peter Thellusson (*q.v.*).

ACCUMULATOR: ITS VARIETIES & USES

P. J. Risdon, Consulting Engineer

Below are described the various types of accumulators. Related information should be sought in articles such as Battery; Cell; Electricity; Hydraulics; Motor-car; and Water Power

An accumulator is a device by means of which energy can be stored for future use. Accumulators are of various types, which differ according to the method in which the power to be stored is generated and applied. For example, a watch-spring may be said to constitute an accumulator in that, when wound up, it conserves and imparts power for operating mechanism, but the term is usually applied to devices for the storage of power in other forms. In engineering, the principal types of accumulator for the storage of energy on a large scale are hydraulic, steam, pneumatic, and electric.

HYDRAULIC ACCUMULATOR. Water being for all practical purposes inelastic, it follows that pressure imparted to it must be maintained without fluctuation, if the water is used for driving hydraulic machinery. To secure a constant pressure of 1,000 lb. per sq. in. requires a natural head of water of more than 2,200 ft. As this is unobtainable, an artificial head of water, giving any desired pressure, is created by the hydraulic accumulator, invented by Sir W. G. Armstrong. Of the several varieties of this, the ordinary weight type (Fig. 1) consists of a long vertical cylinder in which a ram works up and down. The ram is heavily loaded with weights which always tend to force

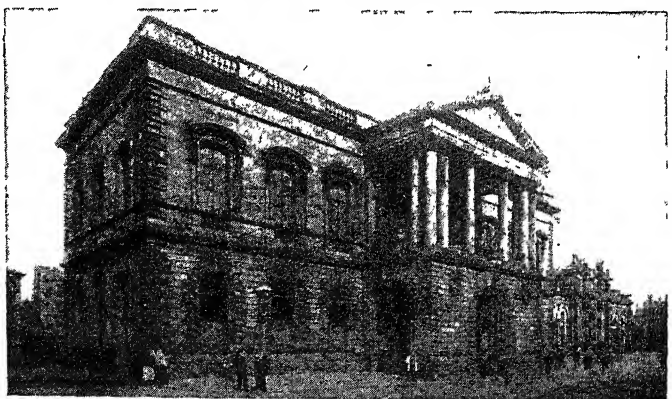
it downwards. Piping connected to the cylinder is laid to the various hydraulic machines to be served. To charge the accumulator, water is pumped into the cylinder at the lower end, lifting the loaded ram to the top of its stroke, when, the cylinder being full, the water supply is automatically cut off. The pressure in lb. per sq. in. exerted by the ram upon the column of water is W/A where W is the weight of ram plus its load in lb., and A is the cross-sectional area of the ram in sq. ins. By varying the weights on the ram, pressure on the water may be increased or diminished.

When, by starting any hydraulic machine, water is drawn from the cylinder, the ram descending maintains a uniform pressure on the water. As soon as water is drawn off, the pumps again come automatically into action and maintain the necessary supply in the cylinder. By this means the pumps, which could not directly maintain a constant pressure supply to meet the fluctuating demands of the machines, are enabled to perform their duty satisfactorily. Working pressures obtained in this manner usually range from 700 lb. to 1,500 lb. per sq. in., although much greater pressures can be obtained. With this type of accumulator the only auxiliary power required is for the water pumps, which can be driven by any power available and sufficient.

The main principle of the differential accumulator (Fig. 2) is the same, but in this case a second and larger cylinder is superimposed on the first, and the top end of the ram is fitted with a larger piston working in this upper cylinder. A third and larger cylinder and a fourth still larger may be added. By the necessary arrangement of valves and piping any one of these pistons may be used, thus giving a choice of working pressures.

The invention of the hydraulic accumulator by Sir Wm. Armstrong opened a great field for the use of water as a medium for the transmission of energy for operating machinery. Under the pressure imparted by an hydraulic accumulator water may be regarded in the light of a flexible piston rod, for, being almost as incompressible, it instantly communicates pressure imparted at one end throughout the length of a pipe.

In shipbuilding and armament works it enables pressures of many thousands of tons to be obtained



Accrington. Town hall, built 1857. The market hall (right), opened 1869, has groups over entrance representing Commerce, Industry, and Agriculture

from a single hydraulic press. On slipways hydraulic rams haul vessels of 5,000 tons each up the incline. In spite of the increasing use of electricity, which in many cases has superseded water power, the hydraulic accumulator is still almost indispensable for heavy work where, as in forging presses, great pressures are required.

STEAM ACCUMULATOR (Fig. 3). Modified form of hydraulic accumulator in which steam pressure is substituted for the load upon the ram. A steam cylinder is fixed above the hydraulic cylinder, in which works a piston, secured to the upper end of the ram. Steam, admitted to this upper cylinder, which is of much larger diameter than the hydraulic cylinder, acting upon the larger piston area, exerts a constant pressure upon the ram. By proportioning the areas of the steam piston and the ram, a comparatively low steam pressure can be made to exert a far greater pressure per sq. in. on the ram.

The advantages of this type are that, by varying the steam pressure, any desired pressure, within the limits of the machine, may be obtained, and that steam, while maintaining a steady pressure, provides a cushioning effect as compared with a dead weight. It necessitates the use of a boiler for generating the steam required.

PNEUMATIC ACCUMULATOR. This is a modified form of hydraulic accumulator. It is similar in action to the steam accumulator, but

compressed air is employed in the upper cylinder in lieu of steam, the advantages being common to both. In this type an air compressor is an essential adjunct. Another form of pneumatic accumulator is known as a compressed air-receiver.

ELECTRIC ACCUMULATOR. This is a secondary cell, storage cell, or "reversible cell," in which electrical energy, passed into the cell as an electric current, is converted into electro-chemical energy and remains inactive until reconverted into an electric current by the discharge of the cell, which takes place when the terminals of the positive and negative electrodes are connected outside the cell. An assemblage of such cells is termed a battery. A secondary cell, when charged, resembles a primary cell in that it is capable of generating

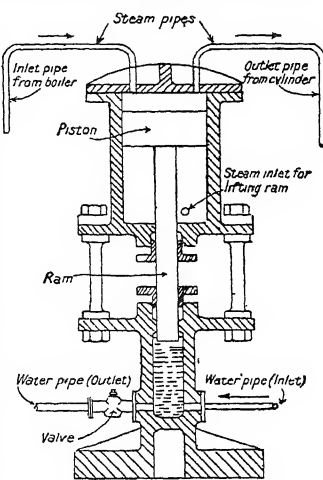


Fig. 3. Steam Accumulator

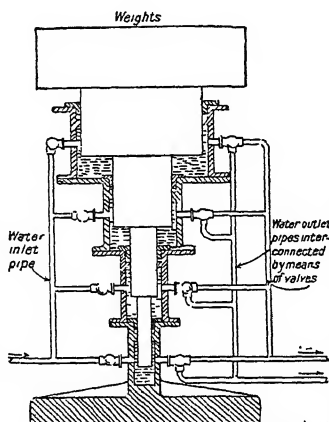


Fig. 2. Differential Accumulator

current, but with the difference that, when exhausted, it can be recharged again and again by passing an electric current through it in the opposite direction.

DESCRIPTION OF CELL. The first satisfactory secondary cell was invented by Planté in 1860, and the principle of this applies to the cell of to-day. It is a lead-sulphuric-acid cell, and consists of a jar or case containing a solution of sulphuric acid and water called the electrolyte; in this two or more lead plates are immersed, known as the electrodes, or as the positive and negative plates, or anode and cathode. The capacity of the cell depends upon the superficial area of plate exposed to the solution: consequently the greater the capacity required the larger the cell and the greater the number of plates employed, the positive and negative plates being arranged alternately.

PREPARATION OF PLATES. Before use the lead plates have to be

formed or prepared. The Planté process was a tedious one, and involved immersing the plates in dilute sulphuric acid and repeatedly passing an electric current through them, first in one direction and then in the opposite, until, as the result of electro-chemical action, the positive plate became coated with peroxide of lead and the negative plate was reduced to a spongy condition of pure lead. This process was simplified in 1880 by Faure, who, by coating the plates with red lead, obtained the desired result much more rapidly. Another difficulty was that a permanent coating of lead sulphate was gradually deposited on flat plates. This led to the substitution of lead grids, into numerous interstices of which a paste, consisting of sulphuric acid and Pb_3O_4 (red lead) for positive plates and PbO (litharge) for negative ones, is firmly pressed, and which is rapidly reduced by the current to peroxide of lead on the positive, and to a soft porous mass of lead on the negative plate, presenting a greatly increased effective surface in contact with the electrolyte, for a given size and weight of plate. This is known as the E.P.S. cell.

CHEMICAL ACTION. This is of a complex nature, but may be explained as follows. Supposing the cell to be fully charged; during discharge, by the electrolytic action of the current, oxygen is freed and conveyed to the negative plate, the surface of which, attacked by the acid, tends to become converted into sulphate of lead, while hydrogen deposited on the positive plate is oxidised by the peroxide and the resultant oxide, attacked by the acid,

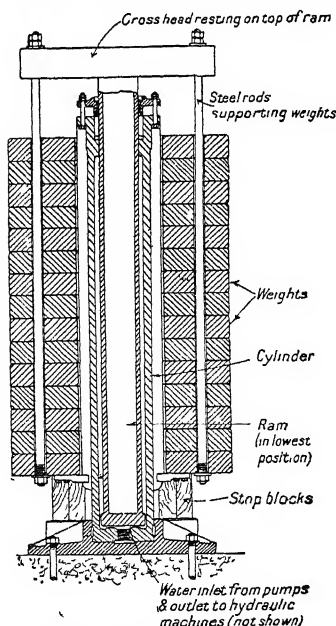


Fig. 1. Hydraulic Accumulator

tends to produce sulphate of lead on the positive plate also, a portion of the acid in the solution being abstracted in the process. When the cell is almost discharged, the temporary loss of acid in the solution will have reduced the specific gravity of the latter to 1.18. This may be checked by means of an hydrometer, and forms a valuable means of ascertaining the condition of a cell. When the battery is recharged, the chemical process is reversed. Hydrogen is deposited at the negative plate, converting it again into pure lead; the positive plate is converted by oxygen into peroxide of lead again, while the sulphuric acid originally abstracted in the formation of the lead sulphate is freed and returned to the solution, raising its specific gravity to 1.2 again when the cell is fully charged.

ELECTROMOTIVE FORCE, E.M.F. This for a single cell averages two volts, commencing, with cell fully charged, at 2.2v. and falling finally to 1.8v. when the cell is nearly discharged. If discharge be continued beyond this point, the plates become permanently sulphated and the efficiency of the cell seriously impaired. The energy efficiency in watt hours under favourable conditions may amount to 70 p.c., but, under unskilful supervision, it may be anything less.

CAPACITY. Capacity is measured in ampere hours, and depends upon requirements, from the small two-cell four-volt accumulator up to large station batteries. The capacity, size, number, and arrangement of individual cells are proportioned to the number of ampere hours and voltage required. Cells may be connected either in series or in parallel. To connect them in series the positive terminal of one cell is connected to the negative of the next, and so on according to the voltage required. Each cell, irrespective of size, gives two volts; variation in size simply affects the number of ampere hours output. Thus the output of 24 cells of 20 ampere hours each in series will be 20 ampere hours at 48 volts. However many cells are connected in series only, the output in ampere hours will be that of one cell. Only cells of the same capacity should be coupled together. To connect cells in parallel all the positive terminals are joined together and all the negatives together; by this means the ampere hours output is increased while the voltage remains at two. Thus if one cell has a capacity of say 20 ampere hours, 24 cells in parallel would give 480 ampere hours but only

at 2 volts. But if the 24 cells be arranged in two parallel rows, each having 12 cells in series, we should get 40 ampere hours at 24 volts.

In station installations a few additional cells are included to overcome circuit resistance, etc., which causes a drop in the voltage. Thus, if a current of 50 volts is to be provided, the number of cells required in series will be not 50/2 but 50/1.85 or 27 cells.

Station cell cases (Fig. 4) are of glass, or lead or lead-lined boxes are employed. Small portable accumulator cases (Fig. 5) are made of celluloid or othersuitable material for lightness.

CHARGING. When an accumulator is charged for the first time, the acid solution must not be placed in the cell until the charging current is ready to switch on. In mixing the solution acid must be added slowly to water—not water to acid—in the proportion of one part (by measurement) of sulphuric acid and five parts of distilled water. When cold, test the specific gravity, which should be 1.19. The rate of charging (direct current) should

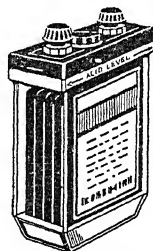


Fig. 5. Radio-type portable cell

not exceed the accumulator rating. The voltage should not be less than the number of cells in series multiplied by 2.75. When fully charged, the specific gravity rises to nearly 1.21, the solution has a milky appearance, and the positive plates are a dark chocolate colour.

Other types of cell include that invented by Edison, who used iron and nickel peroxide in a solution of caustic potash. The mean E.M.F. of this cell is about 1.1 volts. Advantages claimed are great strength and capacity per pound of its own weight; rapid charging and discharging; and that it does not deteriorate if left uncharged.

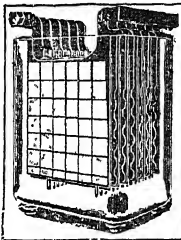
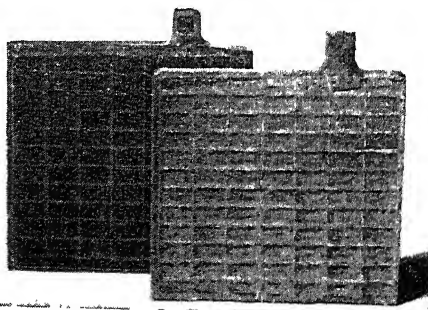


Fig. 4. Country House Accumulator

A special form of alkaline cell is the Drumm accumulator, which is fitted with pencil-type positive plates and negative plates in the form of sheets of gauze, on which metal zinc is electrolytically deposited. A cell of this type is capable of high rates of discharge and can be charged at fairly high rates; generally its characteristics make it suitable for electric trains and it was used on the old Great Southern Railway of Ireland on trains from Dublin.

The nickel-cadmium cell employs nickel hydroxide and graphite as the active positive material and negative plates containing a mixture of cadmium and iron. Discharge characteristics are like those of the Edison nickel-iron cell.

CARE OF ACCUMULATORS. The efficiency and life of lead accumulators depend upon careful maintenance. A cell which might last 8 years may be rendered useless in as many months by mishandling or neglect. (1) The amperage of the charging current should not exceed that for which the accumulator is rated, or the plates become buckled and portions of the active materials fall out as the result of too rapid freeing of the gases. (2) Discharge must not proceed more rapidly than the rated capacity or beyond the point where the voltage drops to 1.85. (3) Accumulators should never be allowed to remain in a discharged condition, otherwise permanent sulphating of the plates occurs. They should not be allowed to remain unused, even when charged, for very long periods. It is better occasionally to discharge and recharge them. (4) The specific gravity of the solution should be occasionally checked and evaporation made good with distilled water only. Too high a specific gravity results in the acid unduly attacking the lead, while



Accumulator. Fig. 6. Plates, lead grids filled with paste (red lead for positive, left, and litharge for negative, right), from small accumulator Hart Accumulator Co. Ltd.

too low a specific gravity reduces efficiency. (5) In replenishing solution only brimstone sulphuric acid and distilled water should be used. (6) Individual cells, as well as the battery, should be tested once a week for voltage and, if incorrect, should at once be examined for short circuit or other defect. (7) Terminals should be kept clean and free from corrosion. (8) If a cell or battery is not required for use for a considerable time it should first be fully charged, all the solution taken out, the terminals cleaned and greased, and in this condition it should be stored in a dry place or carefully packed for carriage. The exterior of cases should be kept clear of all moisture and dirt. Purity of materials and cleanliness are important. These precautions apply to all lead-sulphuric-acid accumulators.

The applications of electric accumulators are numerous. At power stations and hospitals they form a valuable stand-by in case of emergency, such as a temporary failure of the supply. In country-house and similar installations a battery is a necessity, since without it the plant would have to be run whenever a light was required. Small portable accumulators are used for radio sets.

Bibliography. H. G. Brown, *Lead Storage Battery*, 1938; W. S. Ibbotson, *Accumulator Maintenance and Repair*, 1942; G. W. Vinal, *Storage Batteries*, 1940.

Accusation. Term used in English law. It is a crime to accuse or threaten to accuse; or to send to any person any letter or writing with intent to extort money or gain, accusing or threatening to accuse either that person or another of a crime, or of any misconduct not amounting to a crime. For example, when a man wrote a letter to M. demanding 10s. and adding "if I do not get it I shall let Mrs. M. know of your doings with Kate —" the sender of the letter was held guilty of demanding money with menaces. In England this is popularly known as blackmail.

Accusative. Grammatical term. It is the name of an original Indo-European case, denoting the immediate object of a transitive verb and answering the question whom? what? It is supposed to be the case used in naming an accused person. The Greeks called it the causing case (*aitiatiikē*), as giving the "cause" of the action of the verb. In English it is commonly called the objective case.

Ace (Lat. *as*, a unit). Term originally used in connexion with dice, to denote the side of the die with one pip. Hence, the expression, when dicing with two cubes, *deuce ace*, i.e. *deuce* turned up with one die and *ace* with the other. The *ace* is also the one pip in playing cards; but though in dice always indicating the lowest, in cards the *ace* is often the highest of each suit. The term denotes one point at badminton, rackets, tennis, etc.

Ace. Term first used in the First Great War to designate a fighting pilot who had brought down five enemy machines in aerial combat. In France and Germany particularly the scores of the *aces* were followed with great interest. The term was used again in the Second Great War, the U.S. Army Air Force adopting a system whereby a pilot who shot down five enemy machines was an *ace*, and one who shot down ten or more became a *double ace*. British pilots in both wars discouraged the *ace* system.

Aceladama. Name meaning in Aramaic, field or place of blood. The modern Hak ed-Damm, it is a spot S. of Jerusalem identified with the potter's field of Zech. 11 and Matt. 27, and the Aceladama of Acts 1, which Judas bought or the chief priests acquired as a burial-place for strangers. During the Crusades pilgrims were buried here.

Aceraceae (Lat. *acer*, maple). Large family of trees and shrubs whose watery sap in some species yields sugar.

The leaves are lobed, or divided into two rows of leaflets. The flowers are sometimes without petals, massed in corymbs or racemes, the two-lobed carpels developing into the double keys or samaras familiar in the sycamore. They are natives of most temperate countries. The timber though light is useful, and from the bark brown and yellow dyes have been obtained. *See* Maple.

Acetate. The salts of acetic acid, the oldest salts made artificially. They include verdigris (copper acetate), made by the Greeks from grape skins in contact with copper; sugar of lead (lead acetate), a poisonous salt with a sweetish taste; and iron and aluminium acetates used in dyeing.

Cellulose acetate is mostly manufactured by treating cotton fibres (linters) with acetic acid and acetic anhydride in the presence of sulphuric acid as a catalyst. It is the basis of many plastics, films, lacquers (dopes), and rayon (artificial silk). Combined with a plasticizing agent it gives non-inflammable, sub-standard (16 mm. or 9 mm.) cinema safety film which can be used without the special licence required for the inflammable nitrate film. *See* Cellulose; Film; Plastics.

Acetic Acid. Acid ($C_2H_4O_2$) which occurs naturally in the juices of many plants, either in the free state or combined with potassium or calcium. Vinegar contains $\frac{1}{4}$ to 6 per cent of acetic acid and is formed by the action of a ferment, *Mycoderma aceti*, on a weak alcoholic liquor. Vinegar was the only acid known to the ancients.

The acid is largely made by the destructive distillation of wood, the impure acetic acid thus obtained being known as pyroligneous acid. This acid is purified from tarry matters by neutralizing with lime and decomposing the acetate of lime thus formed by sulphuric acid. It is also extracted from pyroligneous acid by solution in ether, later evaporated, leaving the acetic acid behind.

Acetic acid is also obtained by the catalytic oxidation of alcohol with zinc oxide (the acetaldehyde thus produced being further catalytically oxidized to acetic acid); by synthesis from acetylene (another catalytic process); and by synthesis from ethylene (producing alcohol which is oxidized to acetic acid as in the first process).

The strongest acetic acid, known as glacial acetic acid or anhydrous acetic acid, crystallises to a solid at a temperature of 62° F.

Two other strengths of acetic acid found in commerce are 33 p.c. and 4.27 p.c. acids, the weaker being approximately the strength of malt vinegar. Acetic acid in the concentrated state forms the class of salts known as acetates (*q.v.*). Acetic acid is also a solvent of carbon compounds in those industries which depend on organic chemistry.

Acetic Ether. Pleasant-smelling liquid, also known as ethyl acetate, prepared from alcohol by the action of sulphuric acid. Its chemical formula is $C_2H_5(C_2H_3O_2)$. It is used as a solvent in making synthetic fruit essences and in the synthetic preparation of fatty acids, ketones, and other organic compounds.



Aceraceae. The field maple

Acetone. An organic compound ($2\text{CH}_3\cdot\text{CH}(\text{OH})$) of the class of ketones (*q.v.*), of which it is the most important. A colourless liquid with a sweetish, pungent odour recalling wood smoke. Originally obtained in the distillation of wood, it is now prepared by the oxidation of alcohol in a catalytic process and, on a very large scale, by the fermentation of maize starch by the Weizmann bacillus and other bacilli. The latter process also produces butyl alcohol, acetic, butyric and other acids. The acetone and butyl alcohol are distilled off and then separated by fractional distillation. Acetone has special properties as a solvent of organic compounds such as gums, varnishes, resins, fats, celluloid, gun-cotton, etc. It is especially important as the principal solvent for cellulose acetate, the basis for many forms of plastics (*q.v.*). It is used in the preparation of chloroform, iodoform, sulphonal and other medicinal compounds. Very inflammable, it absorbs about 24 times its volume of acetylene, thus providing an excellent illuminant.

Acetone is found in the blood and urine of diabetics and other persons suffering from carbohydrate starvation due to faulty metabolism and a consequent lack of glucose in the tissues.

Acetyl (acet-, and Gr. *hylē*, substance). Radical or base of acetic acid which is chemically acetyl hydroxide. It occurs also in combination with chlorine, bromine, and iodine as acetyl chloride, bromide, and iodide, liquids giving off extremely irritating fumes. Chemically it is $\text{C}_2\text{H}_3\text{O}$.

Acetylene. Hydrocarbon gas (C_2H_2), with a small note unpleasant when pure but very unpleasant as commercially produced. Prepared by the action of water on calcium carbide, itself produced from coal and lime, it is a valuable illuminant and a fundamental material for the preparation of the hydrocarbon plastics, including the important vinyl and polyvinyl series. The well-known polyvinyl chloride (P.V.C.) plastic is a combination of acetylene and hydrochloric acid polymerized under heat and catalysts. Acetylene and acetic acid are polymerized to form vinyl acetate. From acetylene is also produced a series of products used as solvents for plastics (*e.g.* acetone) or as "plasticizers," *i.e.* chemical agents that make cellulose products more flexible and suitable as plastics.

When mixed with oxygen or air

in certain proportions acetylene gas explodes with great violence with an enormous liberation of heat. This fact is made use of in the oxy-acetylene flame, which has the extremely high temperature of over $3,000^\circ\text{C}$. and is used for welding and cutting metals.

Acetylene is a strong illuminant giving a very white flame, a light source sixteen times greater than an equal volume of coal-gas. Its spectrum is very similar to that of sunlight. When liquefied and dissolved in acetone it can be compressed without risk (dissolved acetylene). Acetylene generators for indoor and outdoor lighting consist of carbide chambers, washers, gas holders, and purifiers. Copper piping must not be used owing to the formation of an explosive compound. Acetylene is particularly suitable for outdoor lighting for hand or contractors' lamps of from 20 to 2,500 candle power. See Calcium Carbide.

Achaea (Gr. *Achaia*). Name of an ancient division of Greece. It is on the N. coast of Peloponnesus and is bounded N. by the Gulf of Corinth. Mountainous, with a narrow strip of fertile land along the coast, it is the chief currant-growing district of the mainland. Patras is the chief town. Under the Byzantine Empire Achaea was a despotat or principality, and was conquered by the Turks in 1460. Achaea (or Achaia) now forms a nome or department of Greece, with a pop. of 213,291. There was another Achaea in S. Thessaly. *Pron.* A-ke-a.

Achaean League. Federation of Greek cities in Achaea. The original association of twelve members gradually broke up, but in 281 B.C., after the dissolution of Alexander's empire, ten cities formed a league to check Macedonian encroachment. Under Aratus (d. 213) its influence greatly increased, and under Philopoemen (d. 184) reached its height. After the defeat of Macedonia by Rome at Pydna (168), the sympathies of the members of the league were divided. The Romans seized on internal dissensions and armed resistance to their demands as an excuse for intervention. In 146 the Achaeans were defeated by the consul Lucius Mummius, and Corinth was destroyed. The league was declared dissolved and Achaea became a Roman province.

The head of the league, or strategus, exercised general control over external and internal affairs and commanded in the field. Legislation and questions

of war and peace and alliances were settled by an assembly of citizens over thirty, which met twice a year at Aegium. See Federal Government, E. A. Freeman, 1893.

Achaeans (Gr. *Achaioi*). In Homer, the general term for all Greeks as opposed to Trojans. Strictly they appear to have been the inhabitants of Greece prior to the Dorian invasion. These Achaeans came from the N. some time before 1000 B.C., and displaced a yet older people popularly known as Pelasgians. They seem to have been tall and fair, and were probably akin to the Celts. In historical times the name Achaeans was confined to the inhabitants of the Peloponnesian state of Achaea.

Achard, FRANZ KARL (1753-1821). German chemist and naturalist. Born April 23, 1753, in Berlin, but of French descent, he became famous in connexion with his improvements in the methods of extracting sugar from beet-root. He was supported in his experiments by the king of Prussia, who gave him a farm in Lower Lusatia, where he set up a sugar factory, and was thus the founder of the German beet sugar industry. Later, in Berlin, he conducted important experiments on the electrical behaviour of metals and alloys. He died April 20, 1821.

Acharnians, THE. Comedy by Aristophanes. Performed 425 B.C. during the Peloponnesian war, its object was to support the peace party. It takes its name from the chorus of charcoal-burners from the village of Acharnae, who favour the continuance of the war. Dicaeopolis, an Athenian citizen, in spite of their opposition, concludes a separate peace with the Lacedaemonians.

Achates. In Roman legend, the friend and faithful follower of the Trojan hero Aeneas. Achates is always distinguished by the epithet *fidus* (faithful), and his name has become proverbial. See Aeneid. *Pron.* Akayteez.

Achelous. Longest river wholly within Greece. Now known as Aspropotamo, or white river, it rises in the Pindus mts., flows S. and divides Aetolia from Acarnania before falling into the Ionian Sea. Its length is about 130 m., and at its mouth are extensive alluvial deposits. In Greek mythology, Achelous was a river-god, son of Oceanus and Tethys.

Achensee. Lake in Tirol, Austria, 20 m. N.E. of Innsbruck. It is about 5 m. long by $\frac{1}{2}$ m. broad, and lies amid high and picturesque mountains at an altitude of 3,000 ft.

Achernar. Star in the constellation of Eridanus in the southern hemisphere. Described in the 10th century by the Persian astronomer, Al-Sufi, it is supposed to be identical with θ Eridani, a double star. Its name (Arab. *Akher nar*) signifies the end of the river.

Acheron. In ancient geography, the name of several rivers. The best known was in Epirus. It flowed through the Acherusian lake into the Ambracian gulf, and was regarded with awe as in some way connected with the underworld. Another was in Bruttii, S. Italy. Mythology tells of a river Acheron in Hades, which itself was often called by that name.

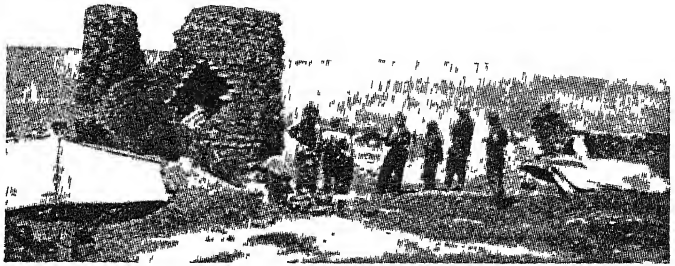
Acheson, DEAN GOODERHAM (b. 1893). U.S. statesman. See N.V.

Acheson, EDWARD GOODRICH (1856-1931). American chemist. Born at Washington, Pennsylvania, March 9, 1856, he was educated at Bellefonte Academy, Pennsylvania. In 1886 he discovered the artificial abrasive, carborundum, which he prepared by submitting a mixture of clay and coal to the intense heat of an electric arc. This material is now made on a large scale at a factory which obtains its power from Niagara Falls. Afterwards he prepared artificial graphite from which electrodes and the lubricants aquadag and oiltag are made. Another product of the electric furnace he invented is siloxicon, from which crucibles are made. He died July 6, 1931.

Acheulian. Middle period of the lower palaeolithic age in Europe, when the warm Chellian was followed by a colder climate. Human remains are scarce, but in 1935 a skull dating from Acheulian times was found at Swanscombe.

The flint industry developed greatly, the boucher, or hand-axe, becoming finer, even-edged, ovate, and then pointed, and the flakes themselves utilized. The period was first studied at St. Acheul, on the Somme—whence the name. The stations extend from England, e.g. Wolvercote and Hoxne, across Central Europe to Poland.

Achi Baba. Hill in Gallipoli. A barren ridge nearly 600 ft. high, it sends out rocky spurs on each side to the sea and so forms a



Achi Baba. Ruins behind which rises the barren ridge, 600 ft. in height, which, fortified by the Turks in the Great War, dominated the toe of the Gallipoli peninsula

barrier across the W. end of the peninsula. In 1915 it was fortified by the Turks, and the British attempts to take it were the main incidents in the earlier part of the Gallipoli campaign. See Krithia.

Achiet-le-Grand. Village of France, in the department of Pas-de-Calais. It is a junction for Bapaume on the Arras-Albert rly. Taken from the Germans by the British, March 17, 1917, it was recaptured by the Germans in the spring of 1918, but regained by the British on Aug. 23, 1918. Another village, Achiet-le-Petit, S.W. of Achiet-le-Grand, was also captured by the British in March,

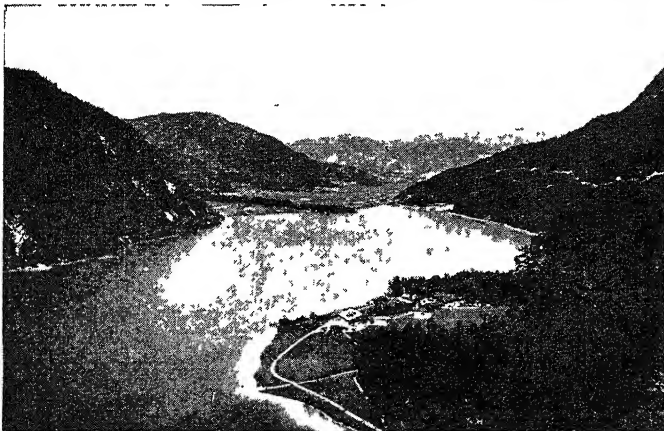
1917, retaken by the Germans in the spring of 1918, and recovered by the British on Aug. 21, 1918.

Achievement. In heraldry, a complete representation of a coat of arms. The shield is surrounded by mantling and accompanied, where the bearer is so entitled, by crest, helmet, motto, supporters, collars and badges of knighthood, and insignia of offices.

Achill OR EAGLE ISLAND. Largest and most beautiful of Ireland's islands. It lies off the W.

coast, forming part of county Mayo, and is joined to the mainland by a bridge across the narrow Achill Sound. Its extreme measurements are E. to W. 15 m., and N. to S. 12 m.; area 57 sq. m. The surface is mountainous (Slievemore, 2,204 ft., Croaghnaun, 2,192 ft.). The Minawn cliffs reach a height of 900 ft. above the sea. Tillage and turf-cutting are the main occupations, and a knitting industry is centred at Dooagh. The island is a popular tourist resort. There are cromlechs, stone circles, and other antiquities. Pop. 4,895.

Achilles. Greek hero, according to legend the son of Peleus and Thetis, and third in descent from Zeus. As king of the Myrmidons, he took part in the expedition against Troy, and in the Iliad, Homer makes him the leading figure on the Greek side; in fact a considerable part of the poem deals with the quarrel between him and Agamemnon (*q.v.*). By his mother Achilles was made invulnerable, the most popular version being that she did this by dipping him in the river Styx. In so doing she held him by the heel; consequently this was untouched by the water and hence originated the proverbial phrase about the heel of Achilles. Thetis further showed her anxiety for her son by disguising him as a girl and sending him to Scyros, in order that he should not sail to Troy; but



Achensee. Picturesque lake of Tirol, Austria, lying amid high mountains, showing the village of Seehof nestling on its banks

Ulysses, visiting the place in the garb of a pedlar, discovered him.

After Achilles had reached Troy he performed redoubtable deeds against his foes. Then came his quarrel with Agamemnon. The

latter, deprived of his favourite, the Greek girl Chryseis, took to himself Briseis, the captive of Achilles, who sulked in his tent and refused to take part in the war. At length the death of his lifelong friend, Patroclus, roused him to action, and, girt with new armour, he rushed again into the fray, and carried



Achilles, Greek hero. Ancient marble statue, from Villa Borghese, now in Louvre, Paris

confusion into the Trojan ranks. Hector, the slayer of Patroclus, was himself killed, and the circumstances of Achilles' own death are variously described, although not by Homer. By some Paris, by others Apollo is named as responsible for it, the fatal wound being given by an arrow which struck Achilles in his vulnerable heel. In the *Odyssey*, Homer tells how his remains were buried on the shores of the Hellespont, and how Ulysses and the Telamonian Ajax fought for his armour, and refers to him as seen by Ulysses in the lower regions.

Achilles. Name of a British light cruiser (7,030 tons) formerly of

pocket-battleship Admiral Graf Spee, Dec. 13, 1939. See *Plate, Battle of the River*; see also in N.V.

Achilles and the Tortoise. Argument used by Zeno of Elea to prove the unreality of motion. Achilles runs a race with the tortoise, which is given a certain start. The distance between them consists of an infinite number of parts, which cannot be traversed in any definite time. The tortoise will, therefore, always be a certain distance ahead, since, the moment Achilles reaches the place formerly occupied by it, it will be no longer there. Aristotle pointed out the main fallacy in Zeno's argument. A given distance, even although infinitely divided, does not thereby become infinite but remains a finite distance which can be covered in a finite time.

Achilles Statue, THE. Monument in Hyde Park, London, near Apsley House. Although the inscription on the pedestal states that the figure is that of Achilles, it is in fact a free reproduction in bronze, by Sir Richard Westmacott (*q.v.*), of one of the colossal marble figures, known as the Horse Tamers, which stand on the Quirinal Hill, Rome. It was cast from cannon captured at Salamanca. Vittoria, Toulouse, and Waterloo. Erected June, 1822, the statue cost £10,000, subscribed by Englishwomen, and was dedicated to "Arthur duke of Wellington and his brave companions in arms." The statue is over 18 ft. high and, with plinth and pedestal of Dartmoor and Peterhead granite, the monument is 36 ft. in height above the road line.

Achin. Region of Sumatra (*q.v.*), Indonesia. Situated on the northern end of the island, it is about 20,500 sq. m. in area. Fishing, boat-building, silk-weaving, and gold-working are its chief industries. The capital is Kuta Raja, on the Achin river, 4 m. inland by tramway from the northern port of Olehleh. Achin has been the scene

of repeated warfare, largely induced by piracy on the part of the natives, who are of Malay descent and were converted to Mahomedanism in the 13th century. The Dutch, to whom Achin with other territory in Sumatra had been ceded by Great Britain in 1824, sent out an

expedition in 1873 to subdue the natives. The Achinese inflicted a severe reverse on the Dutch force, and it required several other expeditions finally to overcome their resistance. Dutch civil government was established in 1880, but hostilities were resumed in 1896 and 1898, and again in 1901-4. Pop. of prov. 789,660.

Achinsk or **ATCHINSK.** Town of the R.S.F.S.R., in the Krasnoyarsk region of Siberia. On the



"Achilles" statue, dedicated to the first duke of Wellington

river Tchulim, a tributary of the Ob, it is 75 m. W. of the town of Krasnoyarsk on the Trans-Siberian rly. Pop. 5,000.

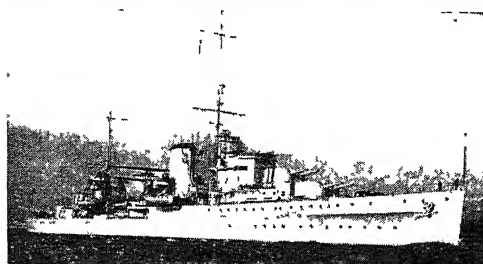
Achish. A Philistine king of Gath with whom David twice found refuge when fleeing from Saul (1 Sam. 21 and 27-9). On the first occasion David feigned madness to avoid recognition.

Achmite. Geological term, synonymous with aegerine (*q.v.*), a green to brown natural silicate of sodium and iron.

Acholi. Tribe of Nilotic negroes in British East Africa, formerly called Shuli. They inhabit the E. bank of the Bahr-el-Jebel, N.E. of the Albert Nyanza. Their mud-lined wattle huts are adorned with ochre designs. Bachelor huts are often built on piles. Their pottery is prized by distant tribes, and they practise scar-tattooing.

Achor. Valley in Canaan. Here Achan was stoned (Josh. 7) for secreting spoil in his tent after the fall of Jericho.

Achray. Small loch or lake in S.W. Perthshire, Scotland, between lochs Katrine and Venachar. It is mentioned in Scott's poem *The Lady of the Lake*. About 1½ m. long and ¾ m. broad, it provides good fishing.



H.M.S. Achilles. British cruiser which took part in the victory over the German battleship Admiral Graf Spee

the New Zealand division. She was completed in 1933 and carried eight 6-in. guns. Manned chiefly by sailors from New Zealand, she joined the *Ajax* and the *Exeter* in a 14-hour attack and chase off the Uruguayan coast on the German commerce raider, the

Achromatic Lens (Gr. *achromatos*, colourless). Optical instrument for correcting the chromatic aberration of white light. When a narrow pencil of white light, such as sunlight, is allowed to pass from one medium to another, as from air into glass, the pencil of rays is not merely bent, but is split up into light of several colours. This phenomenon is referred to as dispersion.

But the dispersive powers of different substances are not the same. We can obtain two prisms constructed of such different materials that, while the angle through which they will bend the average or mean ray of a pencil of light is the same, the amount of dispersion is different; or, on the other hand, when the deviation or bending of the mean ray is different, the amount of dispersion produced is the same. The dispersion produced by flint glass is greater than that produced by crown glass in the ratio of 61 to 43. If two prisms, one of crown glass and one of flint glass, and of suitable angles, are placed with their refracting edges turned in opposite directions—the second being upside down in relation to the first—a ray of white light passing through the first (crown glass) will be bent downwards towards the base, but the red constituent of the ray will be less bent than the violet owing to dispersion.

When these rays, however, having passed through the crown glass prism, set out on their journey through the reversed flint glass prism, the bending or deviation will be in the opposite direction; but the red ray will be less bent upwards than the violet. The difference between the deviations of the red and violet rays being, however, the same in the two prisms, the rays when they leave the second, or flint glass, prism will be parallel. Nevertheless, there will be a general deviation of the rays on the whole because the average or mean deviation in the crown prism is greater than that in the flint. Hence, by combining two prisms, one of crown glass and one of flint glass, the ratio between the refracting angles of the prism having been suitably chosen, we obtain a compound prism which deviates but does not disperse light.

This general principle is applied to construct achromatic lenses, which correct the chromatic aberration of white light when it passes through a lens, and when the curvature of the lens disperses the different coloured rays to different foci. Suppose,

for example, a parallel beam of white light impinges on a convex lens, then where the rays enter and leave the lens the violet rays will be more deviated towards the axis of the lens than the red rays, and thus will come to a focus nearer the lens than the focus of the red rays. With a concave lens the conditions are reversed. If a concave lens and a convex lens of the same material and of equal focal length were placed together, the two dispersions would counteract one another; though in this case there would be no deviation.

But by making the convex lens of crown glass and the concave lens of flint glass, we are able, as in the case of the prisms, to obtain equal and opposite dispersion and still have deviation in the direction of that produced by the crown glass. In effect the combination will be a convex lens with the chromatic aberration eliminated—in other words, an achromatic lens. By the use of two lenses it is possible to make a lens which shall be achromatic as far as the light of two colours is concerned. The combination will not be achromatic for other colours. If instead of two lenses we use three, of different dispersive materials and powers, the combination can be made achromatic for three colours, and so on. The colours for which the lens system is rendered achromatic vary with the uses to which it is put. Thus, in a telescope, achromatism is secured for rays which immediately affect the eye; in photography the lens system must be achromatised principally for the violet rays, and for rays beyond the violet which are called actinic. See Aberration; Light; Spectroscopy.

Achromatin. Cytological term applied by Fleming to that part of the nuclear reticulum (see Cytology) which he found to have little affinity for the usual nuclear stains, in contrast to chromatin, which stains readily with them. The term "linin" was used by Swartz with similar implication. Chromatin and achromatin may prove to be merely the same material in different states.

Achsah. Daughter of Caleb, friend and companion of Joshua. She was given in marriage to Othniel as a reward for his valour in taking the Canaanite city of Debir, and on her wedding day secured from her father certain springs in addition to her dowry (Josh. 15 and Judg. 1).

Achurich, JANET (1864-1916). British actress, whose real name was Janet Achurch Sharp. Born

Jan. 17, 1864, in Lancashire, she first played at the old Olympic Theatre, London, under Miss Genevieve Ward (1883), and later in the Benson Company. In 1889 she joined Charles Charrington, whom she married, in the pro-



Janet Achurch,
British actress
Downey

duction of Ibsen's plays. As Nora in *A Doll's House* she won particular distinction, and Mr. and Mrs. Charrington toured the world with this play, interpreting Ibsen for the first time in English in many lands. In 1911, Janet

Achurich played Mrs. Linde in the revival of *A Doll's House* at the Kingsway Theatre, London. She died at Ventnor, Sept. 11, 1916.

Acid (Lat. *acidus*, sour). Popularly, an acid is any sour substance, but chemically acids are salts of hydrogen, as belonging to a class of substances which always contain hydrogen. Other general characteristics are that they have a sour taste, possess the property of neutralising alkalis to form well-defined salts and change the colour of blue litmus paper to red. As some salts exhibit acid properties, it is necessary to add that the substances must contain no basic elements or group of elements.

It is the presence of hydrogen that gives these compounds their peculiar acid character. Lavoisier held that oxygen is the element to which acids owe their character, but Davy showed that hydrochloric acid (HCl) does not contain oxygen, and Gay-Lussac demonstrated that hydrocyanic acid (HCN) is another acid without oxygen, so the Lavoisier theory had to be abandoned. Other elements than hydrogen are present in acids. If the acid contains oxygen, e.g. sulphuric acid (H_2SO_4), the abstraction of water (H_2O) leaves the anhydride or acid oxide. If the acid contains no oxygen, it is indicated by the prefix *hydro*, e.g. hydrochloric acid (HCl), or hydrocyanic acid (HCN). The termination *ic* indicates that the characteristic element, or group of elements, exercises its highest valency or strength in the form of chemical energy. The termination *ous* means that the second highest valency obtains, while the prefix *hypo*, together with the termination

ous, indicates some lower valency. When an acid contains a high proportion of oxygen, the prefix *per* is used, e.g. perchloric acid.

Some acids on treatment with the hydroxide of an alkali metal exchange all their hydrogen for metal, thus producing a normal salt, while other acids produce acid salts in addition, i.e. all the hydrogen is not replaced. The former variety of acid is termed monobasic, and the latter class polybasic, a term including di-, tri-, and tetra-basic. Formerly all acids were thought to be monobasic, but Liebig enunciated the doctrine of polybasicity, which was further established through the researches of Graham, who showed that phosphoric acid exists in three forms, as ortho-, meta-, and pyro-phosphoric acid.

Inorganic acids or mineral acids are combinations of non-metallic elements with hydrogen only, or with an additional element generally oxygen. Organic acids are considered as derived from hydrocarbons or their alcohols by the replacement of hydrogen (H), or hydroxyl (HO), by the carboxyl group (CO·OH). Organic acids are further divided into aliphatic acids, i.e. those derived from open chain hydrocarbons and aromatic acids from ringed hydrocarbon nuclei. Aliphatic acids are further divided according to the parent hydrocarbon. Examples of inorganic acids are sulphuric acid, hydrochloric acid, and nitric acid, while well-known organic acids are acetic acid, citric acid, oxalic acid, and tartaric acid.

Acidimetry. Chemical process of measuring the amount or strength of acid in solid or liquid substances. If the acid is known to be pure, its specific gravity may give sufficient indication of the strength of the acid, or this may be ascertained by the quantity of alkali needed exactly to neutralise or destroy the acidity. The process being reversible is also known as alkalimetry.

By taking a known amount of a pure alkali, such as sodium carbonate, and neutralising with it the acid of unknown strength, it is easy to calculate, from the chemical reaction, the amount of acid that was present. If, on the other hand, a definite quantity of pure oxalic acid has been used to neutralise a solution of an alkali, the quantity of alkali present can be ascertained. It is necessary that the identity of the substance which is being tested should be established previously

by chemical analysis. The test solutions used are called standard or normal solutions. They are prepared upon such a basis that they bear a relation to the molecular weight of the chemical employed. Only such substances are used for test solutions as can be obtained in a state of purity and remain unaltered in strength for a reasonable length of time.

As both the test solution and the substance that is being tested may be colourless, and afford no visible indication of the neutrality point, certain substances are employed which change colour according as the liquid is acid or alkaline. These are called indicators, among the best-known being litmus—red with acids, blue with alkalis; cochineal, yellowish-red with acids, purple with alkalis; and phenolphthalein, colourless with acids, red with alkalis. The choice of the indicator depends upon the nature of the test that is being made. If the acidimetry is conducted with solutions, and the relative volumes of the liquids furnish the data required, the method is called volumetric. Where the weight of the resulting reaction is the factor taken into account, the process is called gravimetric.

Acidosis. Condition in which certain acids and acetone accumulate in body tissues due to faulty metabolism of fat and scarcity of glucose, as in diabetes. The so-called bilious attack in children is a similar condition.

Acireale. Ancient town and episc. see on the E. coast of Sicily. It is 9 m. by rly. N.E. of Catania, at the S.E. base of Mt. Etna and the mouth of the river Acis, from which it takes its name. It has important thermal springs, is a favourite sea-bathing place, and manufactures silk, linen, cotton, pottery, cutlery, and filigree work. Local features are the cave and rocks of Polyphemus and the grotto of Galatea. Pop. 35,587.

Acis. In classical mythology, a shepherd of Sicily, son of Faunus, beloved by the nymph Galatea. His rival, Polyphemus the Cyclops, crushed him to death with a mass of rock, whereupon the gods changed his blood into a stream of the same name at the foot of Mt. Etna. The story, told by Ovid, is the basis of Handel's secular oratorio, *Acis and Galatea*.

Ackermann, RUDOLPH (1764-1834). German-English publisher and bookseller. Born at Schneeberg, Saxony, the son of a saddler, he came to London,

worked as a carriage draughtsman, and opened a print-shop in the Strand. There he issued a monthly publication called *The Repository of Arts, Literature and Commerce* (1809-28), the series of annuals entitled *Forget-Me-Not*, and illustrated histories of Westminster Abbey, Oxford and Cambridge universities, and the public schools. He introduced lithography to England, and translated a work on the subject by its inventor, Alois Senefelder. He was one of the first inventors of waterproof fabrics for clothing, and promoted gas-lighting in cities.

Acklin OR **ACKLIN'S ISLAND.** Largest of the Crooked Islands, S. Bahamas. It is 45 m. long and 2 m. broad. Pop. 1,744.

Acknowledgment. Legal term chiefly used in relation to the various Limitation Acts, whereby claims to debts or property become unenforceable after a certain lapse of time. These Acts provide that the creditor's or owner's rights shall be kept alive if the other party gives him a written acknowledgment of his rights before the limitation period has expired.

Ackworth. Parish in the W. Riding of Yorkshire, England. It is 3½ m. S. of Pontefract, and is on the rly. At a school here, founded (1779) and managed by the Society of Friends, John Bright and other prominent Quakers received their education. Quarrying is carried on in the neighbourhood. Pop. 4,183.

Acland, SIR ARTHUR HERBERT DYKE (1847-1926). British politician. Second son of Sir T. D. Acland (q.v.), he was educated at Rugby and Oxford, was head of the Military College at Cowley, and became Liberal M.P. for Rotherham 1885-1899. He was best known as a prominent educationalist. He succeeded to the baronetcy in 1919 and died Oct. 9, 1926.

Acland, SIR FRANCIS DYKE (1874-1939). British politician. Born March 7, 1874, son of the above Sir A. H. D. Acland, he was Liberal M.P. for Richmond, Yorks (1906-10), N.W. Cornwall (1910-22), Tiverton (1923-24), and N. Cornwall (1932-39). In Asquith's administration he held several government positions. He died June 9, 1939.

Acland, SIR HENRY WENTWORTH DYKE (1815-1900). British physician. Educated at Harrow and Christ Church, Oxford, he studied medicine at Leyden and Edinburgh. He was regius professor of medicine at Oxford, 1858-94, and largely through his

efforts the study of natural science was introduced at the university. Created a baronet in 1890, he died Oct. 16, 1900.

Acland, JOHN DYKE (d. 1778). British soldier and politician. Eldest son of Sir Thomas Acland, he was M.P. for Callington, Cornwall, in 1774. A vigorous advocate of the war with America, he sailed in 1776 with Burgoyne's expedition. His wife is said to have gone up the river Hudson in an open boat to join him. Acland died Oct. 31, 1778, from a chill caught while fighting a duel.

Acland, SIR RICHARD THOMAS DYKE (b. 1906). British politician. Born Nov. 26, 1906, he succeeded his father, Sir F. D. Acland (*q.v.*), as 15th baronet in 1939. Educated at Rugby and Balliol, he became Liberal M.P. for Barnstaple in 1935. For a time during the Second Great War he served as a gunner. He founded the Forward March group in 1941, and the next year merged it with J. B. Priestley's 1941 Committee to form the Common Wealth party, which he then led until his electoral defeat in 1945. Joining the Labour party, he became M.P. for Gravesend in 1947. In 1943 he transferred to the National Trust (*q.v.*) the family estates at Killerton, Devon.



Sir Richard Acland.
British politician.

Acland, SIR THOMAS DYKE (1809-98). British politician. He was educated at Harrow and Christ Church, Oxford, and gained a fellowship of All Souls. In 1837 he became Tory M.P. for West Somersetshire, but in 1846 followed Sir Robert Peel, and finally joined the Liberal party. From 1865 to 1885 he was M.P. for North Devon. Acland helped to establish the Oxford system of local examinations. He succeeded to the baronetcy in 1871 and died May 29, 1898.

Aclinic Line (Gr. *a*, not; *klinein*, to bend). Line along which there is no dip of the magnetic needle. Elsewhere, owing to the magnetic attraction of the earth, freely suspended and horizontally balanced needles dip downwards at one end after having been magnetised. The aclinic line, also called the magnetic equator, makes an irregular curve roughly following the equator.



Aconagua. The giant of the Cordillera, as seen from one of the high Andine valleys. It gives its name to one of the provinces of Chile

Lines along which the magnetic dip is everywhere the same are called isoclinic lines.

Acne. Chronic disease of the skin, most frequently caused by obstruction of the ducts of the sebaceous or oil glands. Several forms are recognized, the commonest being *acne vulgaris*, which appears most frequently on the face, back of the neck, back, and chest. The first sign is an eruption of small red pimples, which may suppurate, and often in the centres of these a small black point, a "blackhead" or *comedo*, the obstructed termination of the duct, may be seen. Treatment is by local applications and building up the constitution by healthy living.

Acoemetæ (Greek *akoiemetos*, sleepless). Eastern monastic order which flourished in Constantinople in the 5th century. It was dissolved for heresy in 533. The Acoemetæ regulated their worship so that it was continuous day and night, presumably on a literal interpretation of 1 Thes. 5, 17.

Acolyte (Greek *akolouthos*, attendant). Name given in the Roman Catholic Church to a young cleric of the fourth minor order ranking next to a subdeacon. His office, first mentioned at Rome in the 3rd century, was that of a candle-bearer. The name is also given in the Anglican church to one who performs the same duty.

Acoma. Indian village in New Mexico, U.S.A. It is 80 m. W.S.W. of Albuquerque, and is supposed to be the oldest continuously inhabited place in the States. The Spaniards visited it in 1540, and later ravaged it, and about 1630 the Franciscans established a mission here. It stands on a

sandstone rock or *mesa*, at an alt. of 250 ft. above the floor of the cañon, which is here 6,040 ft. above sea level, and is approached by a winding stairway. Around it is an Indian reservation of nearly 100,000 acres.

Aconagua. Highest mt. in S. America, some 90 m. E. by N. of Valparaíso. An extinct volcano, it is in the Andes on the borders of Chile and Argentina, the summit, 23,081 ft., being in the latter country. It was first ascended in 1897 by Zurbriggen. A river of the same name rises on its S. slopes and flows 200 m. to the Pacific.

Aconagua. Central prov. of Chile. Extending from the Andes to the Pacific, it is mountainous and is traversed by the Aconagua river. The climate is hot and dry, and the soil fertile in the river valleys and where it is irrigated. Fruits, alfalfa, and wine are the chief products, and copper, silver, lead, and iron abound. The capital is San Felipe, and the area 3,939 sq. m. Pop. 118,049. *Consult* Aconagua and Tierra del Fuego, W. M. Conway, 1902.

Aconcio, GIACOMO (1492-1566). Italian philosopher, theologian, jurist, and engineer. Having left the Church of Rome, he was banished and took refuge in England. He became a favourite of Queen Elizabeth, to whom he dedicated his *Stratagems of Satan*, written in a tolerant spirit, which made him many enemies. Philosophically, he anticipated Descartes.

Aconite (Lat. *aconitum*, wolf's bane). Plant better known by its common name of monkshood. In medicine the root of this plant is used for the preparation of both

a liniment and a tincture. All parts of the plant are very poisonous, and death has occurred from eating the root in mistake for horse-radish. Aconite root is brown, tapering to a point, with curly rootlets; while horse-radish is white, cylindrical, and without rootlets. Aconite produces a tingling sensation when tasted, followed by numbness, while horse-radish is simply pungent.



Aconite, the common monkshood

The active principle in the plant is an alkaloid, aconitine, which is one of the most deadly poisons known, paralysing the ends of the nerves and the spinal cord, and bringing about death from arrest of respiration. The treatment in cases of poisoning, while waiting for medical assistance, is promptly to give an emetic, keep the patient lying down, apply warmth and friction to the limbs, and artificial respiration if the breathing is failing.

Acorn. Fruit of the oak-tree (*Quercus*). Botanically it is a nut, standing in a cup which is composed of a large number of consolidated bracts.

Acorn Barnacle. A popular name for the genus *Balanus* of the crustacea known as cirripedia. Common objects of the seaside, they are enclosed in a shell, but in the larval state the young at first swim freely about, developing, after several moults, a sucker by which they adhere to any convenient object. These acorn barnacles encrust rocks and



Acorn barnacles. Large form of the genus *Balanus hameri*

shells. One species attaches itself to the skin of the whale, and another burrows into the skin. But they are not true parasites, since, unlike these, they do not derive sustenance from their host.

Acorus. Genus of two hardy perennial plants, belonging to the family Araceae. They are plants of

the water-side, and are known popularly as sweet flags (*q.v.*). They are grown chiefly in the muddy edges of ponds and ornamental lakes. They attain to a height of 3 ft. or thereabouts, and the small yellow flowers are in evidence during the summer. They are increased by division of the roots in the early spring.

Acosta, JOSÉ DE (1539-1600). Spanish Jesuit. He became a missionary in Peru, being one of the first to arrive in Lima. Afterwards he was head of a college at Valladolid, and rector of Salamanca University. He wrote in Latin a History of the Indies, which was translated into Spanish and other languages.

Acoustics (Gr. *akouein*, to hear). The normal interpretation of the word is the behaviour of sound in rooms and halls, as it affects the hearing of speech and music. The Greeks and later the Romans designed large amphitheatres with acoustic effects in mind. In modern building great attention is given to the subject.

The following are the main requirements which have to be met:

(1) Loudness should be adequate.

The distance that the human voice can carry in the open air is usually 50 ft., which means restricting the number of persons in an outdoor audience to 2,000.

(2) Reverberation should be controlled, particularly inside halls. Each sound must die away rapidly enough so that it is not confounded with subsequent sounds. At one time it was thought that the stretching of wires across a hall reduced reverberation, but this has been disproved. The rate of decay of reverberation, in terms of the time that a note takes to die away to inaudibility, can be calculated and checked by test. About one second is found to be satisfactory for small halls and up to two seconds for large halls.

Reverberation can be controlled by the use of sound-absorbent materials. Porosity of the surface is an essential, and special plasters and fibre boards are available for this purpose, the sound absorption qualities being as much as ten times those of normal interior surfaces. The sound absorption of a person is about 30 times that

of a wooden seat, and approximately $2\frac{1}{2}$ times that of an upholstered seat. Since often as much as half the sound absorption in a theatre may be due to the audience, the additional advantage of upholstered seats is clear.

(3) Echoes require to be controlled. The time interval between direct and reflected sound should not exceed $1/50$ th of a second.

(4) External, main, and partition walls must be sufficiently soundproof to exclude outside noise.

Noise may be transmitted to a room by windows, ventilators, or cracks; by vibration of the walls, ceiling, or floor; and by direct transmission of waves from the walls, ceiling, or floor.

Resistance to airborne sound is related to the weight of the intervening structure and is not much affected by cavities unless there is a discontinuity, *i.e.* a hollow wall, in the structure. The nature of the material is of importance, *e.g.* increasing the thickness of a brick wall ten times will only double the sound insulation, whereas with hard felt the insulation is increased directly in proportion to the thickness.

The joint work of the National Physical Laboratory and the Building Research Station has made available much valuable information, and experiments have shown that discontinuity can be of great value, not only for airborne sound but especially where vibration is set up through impact. In a block of flats, for instance, where a false ceiling is provided, the provision of partitions separate from the main structure is of great value. In another example a $\frac{1}{2}$ -in. thick quilting of glass silk was laid on the structural concrete floor: on this building paper was laid before placing a 2-in. reinforced concrete floor, resting on the glass silk.

G. R. FALKNER NUTTALL

Acquaviva, CLAUDIUS (1543-1615). Fifth general of the Jesuits. Born at Naples of a noble family, he joined the Society of Jesus in 1567, and was elected general in 1581. His scheme for regulating Jesuit education, *Ratio atque Institutio Studiorum*, 1586 and 1591, is still authoritative within the society. He died at Rome, Jan. 31, 1615.

Acqui (anc. *Aquae Statiellae*). City and episcopal see of Italy, Alessandria province. On the Bormida, 37 m. N.W. of Genoa, it was a Roman bathing station, and its warm sulphur springs are still frequented. It has a

12th century Gothic cathedral, an old castle, and remains of a Roman aqueduct. The chief manufactures are silk and wine. Pop. 16,500.

Acquiescence (Lat. *ad*, to; *quiescere*, to rest). Legal term, sometimes called "sleeping on one's rights." A person who, knowing his rights, chooses for a time not to enforce them, so as to induce another to believe that he does not mean to do so, will, in a court of equity, be debarred from enforcing them. He "will not be allowed to complain."

Acquittal (Lat. *ad*, to; *quietare*, to quiet). Legal term, meaning the discharge of an accused person by order of the court after he has been properly indicted. Acquittal is a bar to any further prosecution for the same matter.

Acquittance. A legal term, meaning a written discharge of a sum of money due. It is commonly called a receipt.

Acre (Gr. *agros*, field). British imperial land measure containing 4,840 sq. yds. It is divided into four roods. Originally it was the amount of land which a yoke of oxen could plough in a day, and consequently its extent varied. It is now fixed by an Act of Parliament, but local acres, generally smaller in size than the statute acre, still survive in Scotland, Ireland, and parts of England. The word, variants of which are found in most European languages, is occasionally used to denote open ground generally or a particular piece, e.g. the familiar God's acre. See Weights and Measures.

Acré OR **AQUIRY**. River of Brazil. Rising on the Bolivian frontier, it flows E. and N to join the Purus. The name is also given to a territory, 59,000 sq. m. in extent, which Brazil purchased from Bolivia for £2,000,000 in 1903. The territory is rich in rubber forests and its chief town is Port Acré or Alonzo. Pop. 86,638.

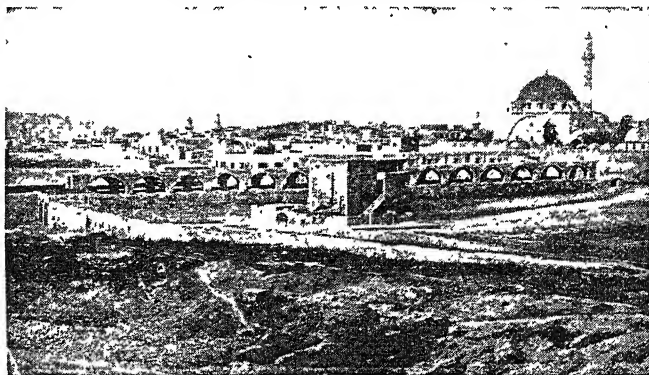
Acre, **St. JEAN D'**, OR **AKKA**. Seaport and town of Palestine. On a promontory at the base of Mt. Carmel, 80 m. N.N.W. of Jerusalem, it is connected by rly. with Haifa and Damascus. The harbour is partly sanded up, and shipping goes mostly to Haifa. It trades in cereals, oil, etc. Apart from the ruined Crusaders' walls, few old buildings remain.

Of remote antiquity, the *Accho* of the O.T. (Judges 1), and the Ptolemais of the N.T. (Acts 21), Acre, known as the Key of Palestine, was captured by the Arabs in 638. Taken by the Crusaders under Baldwin I in 1104, it was reduced by Saladin in 1187, but Richard Cœur de Lion re-

covered it in 1191. It was handed to the Knights of S. John in 1229, and again lost by the Christians in 1291. The Turks took it in 1517, when it fell into decay. After its revival, a French trading community settled here, and Napoleon besieged it in 1799, but was defeated by the Turks aided by Sir Sidney Smith's sailors. In 1832 Ibrahim Pasha captured and held it till 1840, when it was bombarded and taken by the British, Austrian, and Turkish fleets. It was restored to Turkey the next year. During the Great War Acre was occupied by British cavalry under General Allenby, Sept. 23, 1918. During the Second Great War the Syrian Convention was signed at Acre on July 14, 1941, by Gen. Sir Henry Maitland Wilson and the plenipotentiary of the Vichy government, Gen. de Verdillac. Its terms involved the

and had a son Perseus, by whom, when he grew to manhood, Acrisius was accidentally killed.

Acrobat (Gr. *akrobatos*, walking on tiptoe). General term for a professional performer on the trapeze, a tight-rope walker, or a tumbler. In mediæval times such performers, male and female, were called in England tumblers, and their feats are illustrated in several 13th and 14th century MSS. There was a famous rope-dancer named Jacob Hall in the reign of Charles II, and, later, Richer, a celebrated acrobat at Sadlers' Wells. Street acrobats were common in Victorian times; and some are still to be met with at country fairs. A troop of acrobats has always been one of the stock turns of a travelling circus, and daring trapeze performances are to be seen at the chief music halls. A clever acrobat was Charles Blondin.



Acre. General view of the world-famous seaport. Known as the Key of Palestine, it has been the object of fierce contest in many wars.

occupation of Syria by Imperial and Free French forces. Pop. 9,800.

Acridine (Lat. *acer*, sharp). Basic substance ($C_{12}H_9N$) contained in crude anthracene. From this it can be extracted as acridine chromate by adding sulphuric acid and potassium bichromate. On treating the acridine chromate with ammonia the base is obtained. The most characteristic property of acridine is that it causes sneezing when its dust or vapour is inhaled. It is the active ingredient in electric snuff. Acridine derivatives are employed as dye-stuffs.

Acriflavine. Official name of the antiseptic, flavine (*q.v.*).

Acrisius. In Greek mythology, king of Argos and father of Danaë. To prevent the fulfilment of an oracle, which declared he should be slain by his grandson, Acrisius shut up Danaë in a tower. There, however, she was visited by Zeus in the form of a shower of gold,

who in 1859 several times walked across a tight-rope over Niagara Falls. See Le Roux and Garner's *Acrobats and Mountebanks*, Eng. trans. A. P. Morton, 1890.

Acrocerania (Greek *akros*, highest; *keraunos*, thunderbolt). Promontory of Albania, now called Cape Glossa or Cape Linguetta. It had an evil repute in classical times, especially among sailors, and Horace refers to its ill-famed rocks. Shelley mentions it in his poem *Arethusa*, as does Tennyson in his short poem, *To E. L.* on his *Travels in Greece*.

Acrogens (Gr. *akron*, top; *gen*, to be born). Plants that grow by additions to the summit only. The term was formerly used to denote the higher Cryptogams, ferns, mosses and horsetails, while the lower Cryptogams, algae and fungi, were called amphigens (growing all over). Apical growth occurs also in algae, however. But both terms are now obsolete.

Acrolith (Gr. *akron*, extremity; *lithos*, stone). This name is given to the earliest examples of Greek statuary and marks the transition from the use of wood to that of stone and marble. The trunk of an acrolith was of wood, either carved to represent drapery and then gilded, or covered with actual cloth hanging in folds; the head, feet and

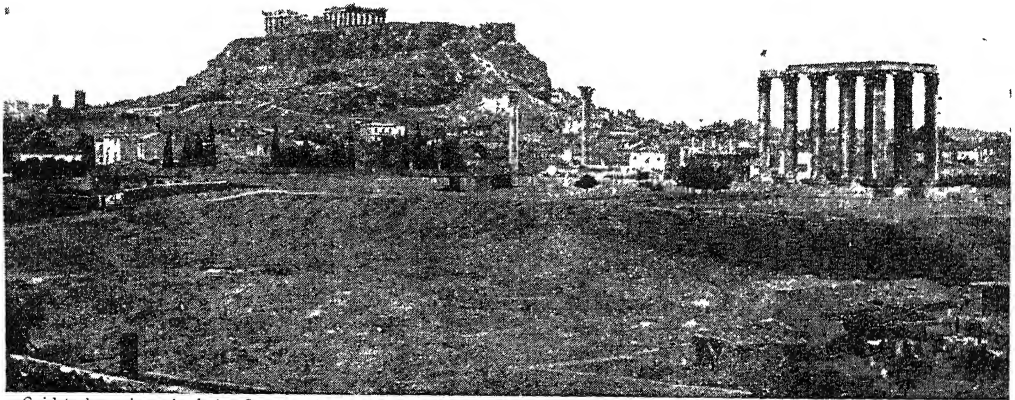


Acrolith depicted on a Greek vase

holds were Tiryns and Mycenae, Acrocorinthus and the Cadmea of Thebes, but the term is specially applied to the acropolis of Athens, generally known as *the* acropolis. This is a long mass of rock 500 ft. above sea level, at its highest point, and precipitous except on its western side. The approach, called the Propylaea, is a wall of Pentelic marble, with five gateways.

During the Persian war its buildings were destroyed but rebuilt by Cimon, and in the age of Pericles it was adorned with splendid specimens of Athenian architecture: the Parthenon, or temple of the maiden goddess Athena, from which the Elgin

published in 1882. The titular essay describes the author's journey in 1879 across the United States to San Francisco. He describes his experiences in an emigrant train and puts in a plea for the Red Indians and Chinese. Another essay describes Monterey, the old capital of California. After discussing Fontainebleau, in *Random Memories* and *The Lantern Bearers* he deals with episodes of his youth and boyhood. Following an essay on *Dreams* and a characteristic one on *Beggars*, the collection ends with *Pulvis et Umbra* and *A Christmas Sermon*, the former one of the most remarkable of Stevenson's productions



Said to have been built by Cecrops, legendary first King of Athens, the Acropolis has been in turn fortress, sanctuary, and museum. Its buildings have served for more than 2,000 years as models for some of the most admired structures in the world. They include the ruins of the Temple of Victory, the Parthenon, and the Erechtheum. (See col. plate facing p. 1)

ACROPOLIS: THE ANCIENT CITADEL OF ATHENS, VIEWED FROM THE SOUTH-EAST

hands were in stone. These early statues represented either a god or a priest. See *Chryselephantine*.

Acromegaly (Gr. *akron*, top; *megas*, large). Rare disease, the most prominent symptom being enlargement of the bones, particularly those of the jaw, hands and feet. It is due to enlargement of the pituitary gland at the base of the brain and is frequently associated with gigantism. A pituitary gland operation may improve the condition.

Acropolis (Gr. *akros*, topmost; *polis*, city). Greek hill stronghold. Applied originally to a site on the top of a rocky hill, the word came to mean the citadel itself, which gradually became a political and religious centre. Such strong-

Marbles, now in the British Museum, were brought to England by Lord Elgin in 1812; the Erechtheum, sacred to Poseidon, god of the sea, and to Erechtheus, a mythical king of Athens; the temple of Nike Apteros or Wingless Victory; the Odeum, a hall for musical entertainments, built by Pericles; the theatre of Dionysus; and a temple of Asclepius (Aesculapius). The statues included the colossal Athena Promachos in bronze; the ivory-and-gold statue of Athena by Pheidias in the Parthenon, and six statues of maidens known as the Caryatides in the Erechtheum. See Athens.

Across the Plains. Volume of essays by R. L. Stevenson

and both containing much of his philosophy of life.

Acrostic (Greek *akron*, end; *stichos*, row). Series of lines of which the first words are chosen because their initial letters, read downwards, compose a word or sentence. In the double acrostic ingenuity is carried to the further point of making the terminal letters of each line perform a similar, complementary, function. Although now regarded as mere literary trifling, acrostics once engaged the serious attention of poets and poetasters. Sir John Davies (1569-1626) is more generally remembered for his twenty-six Hymns to Astraea, the initial letters of every one of which form the words Elisabetha Regina, than

for his eminent services as a lawyer. Acrostics were a form of poetical composition among the Hebrews, e.g. Ps. 119, and sometimes among Christian poets.

Acroterium. In classic architecture, a pedestal for a statue on the apex or at one of the lower angles of a pediment. The feature occurs frequently in neo-classic work. The term is sometimes used improperly of the statue itself when in position.

Act (Lat. *actus*, done). In English law, a term generally relating to something, not done in court, which has some legal effect. When a man seals a deed, he generally touches the seal and says, "I deliver this as my act and deed."

Act. In drama, that portion of a play which is performed continuously, and is followed by a brief period of rest, or *entr'acte*, intended to denote the passage of time. This division, even that into five acts, dates back to Roman times. On the other hand, the ancient Greek drama was not thus divided, breaks in the action being filled in by choric passages. Modern dramatists have largely broken with the five-act tradition, and their plays are frequently divided into no more than three acts indicating three more or less definite stages in the story unfolded—exposition, development, and climax. An act may consist of one or several scenes. See Drama.

Acta Diurna (Lat. daily acts). Official bulletin published daily in Rome after 59 B.C. by order of Julius Caesar. The vehicle for public notices of various kinds, its scope was not unlike that of The London Gazette.

Actaeon. In Greek mythology, a famous huntsman, pupil of the centaur Cheiron. Having watched the virgin goddess Artemis (Diana) bathing, he was changed by her into a stag, in which form he was torn to pieces by his fifty dogs on Mt. Cithaeron. The dogs are supposed to represent the dog-days which destroy vegetation.

Acta Pilati (Latin, Acts of Pilate). Name given to the first part of the spurious Gospel of Nicodemus. Originally written in Greek, it was circulated in Latin and other languages before the invention of printing. It purports to be an official report of the trial and crucifixion of Christ, drawn up by Pontius Pilate.

Acta Sanctorum (Lat. Acts of the Saints). Collection of histories and legends of saints and martyrs projected by Heribert Rosweide (d. 1629), and begun at Antwerp in 1643 by Jan van Bolland, a Jesuit. See Bollandists.

ACTING: THE ART OF THE STAGE

F. G. Bettany, and *Donald Wolfitt, Leading Shakespearian Actor

This subject may be studied further under such headings as Drama and Theatre, Comedy and Tragedy, and in the biographies of eminent actors and actresses which appear under their respective names

The origins of the art of acting, like those of drama, are probably to be traced in ritual, associated as that must usually have been with dancing. To this, which from a religious gradually became a communal affair, first pantomime, then recitation or dialogue would be added. Masks were worn by primitive tribes, and masks long kept their place in connexion with the art; early players sometimes copied the appearance and movements of animals—so perhaps arose comic acting—and only by degrees would speech replace mere incantations of magic. Some such outline of development appears warranted by the researches of anthropology and reports as to stage beginnings in the East, but we do not tread relatively firm ground until we reach the classical territory of Greece.

isation than Comedy, either old or new, and apparently the tragedians intoned their speeches.

Padded in figure, debarred from facial display, raised as on stilts upon the cothurnus, they had to rely almost wholly on voice with audiences that might be ten times as large as ours. Thus the performance of Aeschylus as actor can have been scarcely more than declamatory recitation. More like modern acting may have been that of Polus, reproached with carrying his son's ashes in the rôle of Electra to stimulate his emotions. The talent of comedians has few Hellenic eulogists, and generally it may be said of the actor that it was in Rome rather than in Greece that he attained his apogee. Roscius, freed slave made senator, genius in comedy, and trainer of Cicero in diction, may rank as prototype of his profession.

In few spheres can history be seen repeating itself more exactly than in that of acting. In the Middle Ages, really a new civilization, it starts again much as in Greece or the East. The first medieval actor was the priest who dramatised his Church's service; and in the miracle plays, until they were given in the streets, the clergy must have monopolised the acting. With their withdrawal, such plays, and also the moralities, became municipal undertakings which guilds shared in managing, and in which citizens represented the characters. Shakespeare, of course, has a skit on these artisan amateurs. Taste took no exception to nakedness where implied in the text, and realism in scenes of torture and chastisement made the acting of such a serious ordeal.

Clowning folk-comedy passages figured in most miracle plays, and from quite early days seem to have been left to professionals. As the divorce between Church and stage widened and the mysteries passed into the hands of artisans, and from theirs into those of strolling players, the clergy's attitude changed, with the result that before the end of the 16th century interdicts vetoed performances of ecclesiastical plays everywhere. The Church complained of the ignorance of the actors, their lack of fluency or of a decent accent, their tricks of false emphasis and of contradicting the sense of their words by their gestures—a far



Actaeon changing into a stag and attacked by his dogs
Antique in British Museum

Here, in the festivals from which tragedy and comedy derive, there was a processional or communal element, perpetuated in the chorus. Playwrights began by being dancers who taught the crowd the songs and dances of their craft. Their songs would describe some god's or demi-god's adventures; when the leading man impersonated his hero, instead of singing about him, real acting had arrived. The masks used, the choice of superhuman types, and the inevitably lyrical presentment of their passions would make for formality in acting, and give far less scope to character-

higher level seems to have been reached in secular plays by Hans Sachs and his tradesmen colleagues in Germany at this time—and so with the discouragement of the civic fraternities the boards were cleared for the advent of the professional.

Acting: Raised to an Art

The French farce players provided something of the sort. But their methods were coarse, their technique was trivial alongside the work of exponents of the famous Italian comedy of art, improvisers who, to the mere skeleton of a scenario, supplied business and dialogue, and often long tirades or interludes of pantomime. Their parts, it is true, were stock types repeated in play after play. Yet here at last we get acting raised to an art. At their best these men and women studied, experimented, went in for team work, not only employed their voices, faces, memories, and command of feeling, but invented, exercised imagination, collaborated with their author. No wonder their fame spread over Europe, and their vogue, despite the artificiality of characters such as Harlequin and the rest, some of which Molière was not above borrowing, lasted for generations, though now we discover traces of them only in our puppet shows.

On the English stage talent soon revealed itself with the opportunities afforded by Shakespeare. The man who played Richard III, Hamlet, Othello and Lear in the poet's own lifetime must have satisfied even so severe a critic of acting. We are told that Burbage had a Proteus-like art. Possibly we might have found him too declamatory, for the Elizabethan stage, whatever its structure, was essentially a platform stage, and the appeal of the theatre was, and continued to be, rhetorical and perhaps statuesque rather than, as in our days, pictorial, till the last relic of the apron (or projecting part of the stage between the footlights and line of the curtain) disappeared and the proscenium arch served as frame for a picture. So it was quite easy for a Rosalind to step out of a play and address her audience.

Boys played heroines' parts, women being kept off the English stage longer than from Continental stages; they were popular, and boys' companies at one time threatened to rob the adult actor of a living. But this was effected temporarily, not by them, but by the Puritan. With the Restoration, to the reopened theatres came the actress, scoring

at first chiefly as comedienne. Her influence would seem to have bettered the technique of comedy acting, certainly in France well before the close of the 17th century, as we can judge from the account Molière gives in his *Impromptu de Versailles* of his conduct of a rehearsal. He bears witness to the care taken about accentuation, character-painting, and ensemble. Nor was the French theatre of this era without its genius, Baron, whose greatest triumphs came after Molière's death.

Betterton, to turn to England again and go back a little in time, would seem to have had a stiffer style. Authoritative, wonderful in the expression of awe—as Hamlet's in the Ghost scene—full of a rather pompous oratorical power, he gave his time what it asked, dignity, and avoided what it shrank from—anything that jarred on its ideas of good form and deportment. Despite Malone's praise, we can hardly believe Betterton to have shown much imagination or flexibility. It was left to Garrick, despite his quaint dressing of Romeo and Macbeth, to restore naturalism to the stage and replace tumid declamation by insistence on the human element in acting. If he supplied neither romance nor historical colour, his versatility and the suppleness of his diction are unquestionable. Able to carry away his audience equally by the passion of his Lear and the drollery of his Brute, he needs no modern certificate as to his range. It is this which entitles him, rather than a Schröder, to stand as representative actor of his century.

Convention versus Realism

There was much, however, for the stage to learn even after Garrick's reign—greater concern for the subtleties of character, a keener instinct for the picturesque, historical imagination, the ability to suggest what is fanciful and spiritual in art. Between whiles, the old fight goes on between convention and realism. The personality of a Clairon or a Siddons may recommend what is formal in delivery and pose for a time, but there is sure to be reaction. And so we see repeated efforts to return to nature in the methods of a Talma, a Lemaître and perhaps a Rachel in France, or a Kean and a Macready in England. A Phelps holds on to tradition, while an Irving or a Tree, with a feeling for the pictorial and modern ideas of psychology, interprets familiar characters in a way to lend them novelty and depth. Each age has the woman player who realizes its

ideals; thus, with the Anglo-Saxon community the gentle Helen Faucit, the romantic Adelaide Neilson, the virginal Mary Anderson, the buoyant, full-blooded Ada Rehan. Acting, in fact, if it is to keep alive, must be constantly readjusting its technique to catch the tones, gestures, and fashions of contemporary life. But as certainly it is always being dragged back to artificiality. Great players create a legend which it is the function of the young to destroy, and the task of the latter is rendered all the harder by the accretion of "business" which has settled round well-known parts.

Equipment of the Actor

It is time to ask what is the equipment of the ideal actor. Since he must be a perfect instrument and his body must form no small part of that, he should, unless specialising in comic or eccentric character, be well proportioned, have an agreeable bearing, and possess features which are mobile and can be built up into something like beauty or strength. He should keep himself physically fit, be a fair adept at fencing, have mastered the tricks of make-up, be able to wear clothes of all periods easily, and gesticulate far more freely than is common in English private life: he should have learnt repose, and with it the manipulation of the hand, the carriage of the person, and the art of throwing himself into graceful postures. He should be acquainted with the customs and manners of different eras and know, if only to reject, the traditional glosses on the more famous rôles. He should own a trained and musical voice, have the gift of memorising, and the adaptability to work in ensemble, to keep inside the stage picture and to form a picturesque part of it. He must have the instinct for phrasing, no less important, as Charles Wyndham showed, in comedy than in poetic drama; he must live the character he plays as much when silent as speaking. Finally, to say nothing of imagination and brains, no bad substitutes for genius, he must have laughter, emotion, and every mood ready at the playwright's call, and even have power to serve as his colleague. Stage dialogue is a shorthand which the actor is expected to translate and expand.

Which is the best histrionic material—a personality that is wax-like, with no strongly marked characteristics or one that is definite and assertive? Should a player be able to merge all that individualises him, or may he



These studies in the art of giving facial expression to the emotions of assumed character were specially made for this encyclopedia by Mr. Donald Wolfit, the well-known Shakespearian actor, and Miss Rosalind

Ida. The emotions they illustrate are: 1, Reproach; 2, Grief; 3, Amusement; 4, Dislike; 5, Dictatorship; 6, Joie de Vivre; 7, Cunning; 8, Horror; 9, Contemplation; 10, Amiability; 11, Mirth; 12, Supplication

ACTING: TWELVE STUDIES IN THE DIFFICULT ART OF FACIAL EXPRESSION

Photographs specially prepared for New Universal Encyclopedia by Vandyk

adapt the character to fit himself? In practice we have both types. Irving insisted on making his Shylock romantic, dignified, and sympathetic. Duse rubbed all the hardness off a Magda and gave us Eleanora Duse in every rôle. The modern tendency, on the other hand is to suit parts to actors and encourage them in an eternal self-exploitation.

Should players feel their parts? Most English actresses have wept with their heroines; a Coquelin would have regarded emotionalism as part of his technique. Indeed, Coquelin urged that all art is a distortion of nature, so regulated as to be accepted for it. Undoubtedly there is an element of exaggeration in all acting. It involves over-accentuation of gesture—English gesture at least—over-emphasis of speech, and a certain calculated surrender to, or pretence of, feeling. Not a few players, including so fine a comedienne as well as mistress of emotion as Mrs. Kendal, seem to find laughter more difficult to evoke than tears.

Acting may sometimes take away from the author's purpose, but if it has genius it adds something—not easily defined, but dependent on imagination, personal magnetism, instinct. The great actor has intuitions, tones, lightning flashes which pedantry denies at its peril. The critic who wants to claim all credit for the literary artist and reckons the actor as his mere tool or marionette had better sit at home with his own private puppet show, while folk with warmer blood in their veins are thrilled by some modern Salvini or laugh with the newest Nell Gwyn.

F. G. Bettany

The above résumé of the art of acting, written for the original edition of this Encyclopedia, is in every respect admirable, and there is nothing a modern reviser needs to change. It remains unaffected by the little that happened in the art of the theatre between the two Great Wars. The advent of the talking film, which is still in a comparatively early stage, has perhaps robbed the theatre of the necessity for great spectacular productions and brought it back to simpler methods; so that virtuosity and the personal contact of great acting is once more in demand. Under-acting and plays of understatement were typical of the period, but represented an ephemeral phase. The turmoil of war

and the invasion of Great Britain from the air has brought a new audience to the British theatre which, after a spate of film-going, is as ready to be moved by great acting as it is by great musical composition and orchestral interpretation. Under the influence of creative artists, the vitality of great drama is surging upwards again.

Donald Wolfst

Actinic Rays (Gr. *aktis*, ray).

Rays of sunlight which do not give out heat, but produce chemical changes, as in photography. A beam of sunlight is made up of rays which range in colour from red to violet. Beyond these red rays are invisible rays called infra-red, and beyond the violet other rays, also invisible, known as ultra-violet. The infra-red rays and those in their neighbourhood were regarded as those giving out heat and were thus called calorific rays. The rays at the other end of the spectrum, the ultra-violet, which are of much shorter wave length, do not give heat, but are much more active in producing chemical changes. They were first called actinic or chemical rays by Sir John Herschel, and before photographic emulsions were made sensitive to red and infra-red rays, the term was applied only to the blue, violet and ultra-violet. The ultra-violet rays have also been called Ritterian rays after their discoverer, Ritter. See Infra-red Radiation; Light; Ray Therapy.

Actinium. Chemical element, atomic no. 89. A radio-active substance accompanying thorium extracted from pitchblende, it was discovered by Debierne in 1899 and isolated in Chicago in 1948 by the bombardment of radium with neutrons. It disintegrates on keeping, seven successive radio-products having been identified as formed during the process. Actinium emanation renders bodies with which it comes in contact temporarily radio-active. Approx. 10 tons of uranium ore would yield one 30,000th of an oz. of actinium.

Actinograph (Gr. *aktis*, ray; *graphein*, to write). Instrument used in conjunction with the Herschel actinometer for recording the variations in power of the solar rays. It is a self-registering photometer.

Actinolite (Gr. *aktis*, ray; *lithos*, stone). Natural silicate of calcium, magnesium, and iron. A member of the group of monoclinic amphiboles, it contains no alumina and is green in colour.

It occurs in fibrous aggregates, or elongated crystals, and is a common constituent of crystalline schists and thermally metamorphosed rocks.

Actinometer. Instrument for measuring at any moment the direct heating power and chemical properties of the solar rays. See also Exposure Meter.

Actinomycolosis (Gr. *aktis*, ray; *mykēs*, fungus). Disease in cattle, occurring rarely in the horse, and sometimes in sheep, pigs, and dogs. Human beings occasionally suffer from it. In cattle it is commonly known by the name of wooden tongue, because it usually attacks that organ, producing a hard growth. The disease is due to a parasite known as the ray fungus, which enters the animal by means of some foodstuff, especially barley, on which the fungus grows. This makes its way into the animal's tissues through some abrasion in the mucous membrane or through a bad tooth, and thus irritates the tissues and produces a tumour which is followed by suppuration and ulceration. See Bacteriology.

Action (Lat. *actio*). Term used in various senses. In physical science action at a distance is referred to in Newton's third law of motion thus: "to every action there is always an equal and contrary reaction; or the mutual actions of any two bodies are always equal and oppositely directed." When one body acts on another body so as to influence it, then the whole phenomenon of the mutual action is called a stress. Hence Newton's third law states that all forces are of the nature of a stress between bodies or portions of matter, since every force must be accompanied by an equal and oppositely directed reaction.

If you press your hand on a table, you feel the table pressing your hand. If a horse is towing a boat, the forward pull of the horse on the towrope is exactly equal to the backward pull of the towrope on the horse. In such a case it is easy to see how the horse exerts a force on the boat, because it is by the stretched rope. But sometimes it is not possible to detect the agency by which one body acts on another—as when a piece of iron is attracted by a magnet, or the waters of the earth are attracted by the moon. In these instances we ordinarily use language which implies that matter can act upon matter at a distance, without any connecting agency, by means of an agent which we call force. Nevertheless, we are unable to think of one portion of matter

acting on another without something connecting the two, by which the action is transmitted. This something was called the *medium* of the transmission of these forces, and although no one could imagine the real nature of this medium which enabled bodies to attract one another even at stellar distances, yet it was confidently asserted that such a medium, usually called the luminiferous or light-bearing ether, did exist. The famous Michelson-Morley experiments between 1887 and 1904 indicated that the ether of space was useless as a postulated medium for the transmission of action between bodies; and, further the development of the theory of electro-magnetic radiation to include light, heat and all forms of radiation, made the conception of a physical ether increasingly untenable. In 1905 Einstein developed his theory of relativity (*g.v.*), which made the ether an entirely superfluous concept. No explanation of action at a distance has been provided, and the propagation of radiant energy remains unexplained. *See Ether; Light; Radiation.*

Action. In legal phraseology this term means "a civil proceeding commenced by writ, or in such manner (*e.g.* by originating summons) as may be prescribed by rules of court." Thus, divorce suits are not actions, nor are bankruptcy proceedings, because they are commenced by petition and not by writ. Nor are criminal proceedings actions, because they are commenced by summons, indictment, or information; and, moreover, they are not civil proceedings. Before the Judicature Act, 1873, only Common Law proceedings were actions. Now the term is properly applied also to proceedings in the Chancery, the Admiralty, and the Probate Divisions of the High Court of Justice, and in County Courts.

Action Française. L'. French newspaper and political group. Founded as a monthly periodical in 1898 at the time of the Dreyfus case, L'Action Française became a daily newspaper in 1908, soon noted no less for its literary brilliance than for its unbridled invective. It supported the restoration of the French monarchy, a return to the old system of provincial administration, the grant of a privileged position to the Roman Catholic Church, and in industry a corporate state on Fascist lines. At the outbreak of the Second Great War L'Action

Française took up a pro-Allied attitude; but after the fall of France in 1940 its attitude changed to one of support for Pétain. With the liberation of 1944, it was suppressed by the De Gaulle provisional govt., along with all other collaborationist periodicals.

Action. Promontory of Acarnania on the coast of ancient Greece. Here, Sept. 2, 31 B.C., the great naval battle took place between the forces of Antony and Cleopatra and those of Octavian, commanded by Agrippa. Antony's defeat left Octavian (Augustus) master of the Roman world.

Act of God. Term used in English law to mean some act or convulsion of nature so extraordinary that it could not be foreseen; or, if foreseen, could not be guarded against. For example, an extraordinarily high tide, a tempest of rare violence, and the like. Act of God is, as a rule, a good defence to an action.

Act of Parliament. Official name for a measure which, having passed through both Houses of Parliament and received the royal assent, has become the law of the land. In Rome records were usually known as *acta*, and the word has been carried from there into many legislatures of the world. The laws of the U.S.A. are called Acts of Congress, and in the Canadian, Australian, and other Parliaments of the British Empire the word act is used.

In the British Parliament, and in those bodies which have modelled their procedure upon it, the word bill is applied to a measure on its introduction, and for it to become an Act the following stages are necessary. It is introduced into one House or the other by one of its promoters, and is read a first time, a formal proceeding only; then comes the second reading, the critical stage when the decisive vote is taken. If approved, the bill is sent either to a committee of the whole House or to a standing committee much smaller in size; there it is examined clause by clause and not infrequently altered. All alterations are reported to the House and, if approved, the bill is read a third time. It is then sent to the other House, where the same procedure is gone through, and finally, having received the royal assent, it becomes an Act.

Such is the usual procedure for public bills, and, with certain modifications, for private ones, but there are exceptions, chiefly

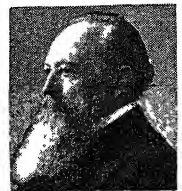
those made by the Parliament Act of 1911. Money bills must originate in the House of Commons, and do not need the approval of the Lords in order to become law. Further, any bill which, under certain conditions, has passed the Commons three times in successive sessions becomes an Act whether the Lords will or no.

In olden times it was the custom for all the Acts passed in a single session of Parliament to form a single statute, and this still survives. The Acts of each session are arranged in chapters, and officially quoted according to the year of the reign in which they are passed; for example, the Act by which King Edward VIII abdicated is cited as 1 Edward VIII, ch. 3. To obviate the inconveniences of this system each Act is given a short title by which it is usually known. The Acts of the English Parliament go back to 1235. The Acts of the Scottish Parliament date from about 1430 to 1707.

Acton (A.S. *ac.* an oak; *tun*, a town or farm). Mun. and parl. bor. of Middlesex, England, 4 m. W. of London (Paddington). A residential and industrial suburb, easily accessible from London by railways and London Transport, it has manufactures of motor parts and accessories, engineering works, printing works, food products, laundries, and many other industries.

In 1922 important extensions were made to the local hospital as the chief part of Acton's war memorial, and further extensions were made in 1928. The town hall, including an assembly hall with a seating capacity of 1,000, was completed in 1939. Acton returns one M.P. Among residents were Richard Baxter and Henry Fielding. Pop. 68,940.

Acton, JOHN EMERICH EDWARD DALBERG, 1ST BARON (1834-1902). British historian and moralist. Born Jan. 10, 1834, at Naples, of an old Roman Catholic family. Acton was the son of Sir John F. E. Acton, 7th Bart., by a German wife. He was educated in Paris, at Oscott



John, Lord Acton,
British historian
Elliott & Fry

under Wiseman, and finally at Munich for six years under Döllinger, with whom, in 1857, he visited Italy. In 1855 he

went to the U.S.A., and in 1856 to the coronation of Alexander II.

In 1858 Acton settled at Aldenham, Shropshire, where he formed his famous library of 59,000 volumes, now in the university of Cambridge. He sat as Liberal M.P. for Carlow, 1859-65, but spoke only once in the House. He was a friend and admirer of Gladstone, by whom, in 1869, he was raised to the peerage. In *The Rambler*, *The Home and Foreign Review*, and other periodicals, Acton consistently endeavoured to widen the view of English Roman Catholics, but his advocacy of the reunion of Christendom and his opposition to papal infallibility were viewed with disfavour at Rome, and the publications were stopped. In 1874 Acton replied in *The Times* to Gladstone's pamphlet on the Vatican Decrees.

Honoured by many universities, Acton was appointed, in 1895, regius professor of modern history at Cambridge and elected honorary fellow of Trinity College. He remained until his final illness in 1901 in full communion with Rome, and died June 9, 1902, at Tegernsee, Bavaria, where he was buried. Lord Acton was a profound scholar and a gifted historian. He planned *The Cambridge Modern History*, but wrote little, and his lectures and contributions to periodicals remained uncollected until after his death. His great library of 59,000 volumes was bought by Andrew Carnegie. Carnegie presented it to Lord Morley, by whom in turn it was presented to the University of Cambridge.

Bibliography. Letters to Mary Gladstone, with memoir by H. Paul, 1904; *Lectures on Modern History*, 1906; *History of Freedom and other Essays*, 1907; *Lectures on the French Revolution*, ed. J. N. Figgis and R. V. Laurence, 1910; *Acton, The Formative Years*, David Mathew, 1945.

Acton, Sir John Francis Edward, 6th Bart. (1736-1811). Prime Minister of Naples under Ferdinand IV. Born at Besançon, France, the son of an English physician, he entered the Tuscan navy. In 1779 he was invited to reorganize the Neapolitan navy, and became successively minister of marine, minister of war, generalissimo of the sea and land forces, minister of finance, and prime minister of Naples. His aggressive policy was highly distasteful to France and led to his downfall. He died at Palermo Aug. 12, 1811.

Acton Burnell. Village of Shropshire, England, 8 m. S.E. of Shrewsbury. In 1283 Edward I, then fighting the Welsh, called a



Actor. Scene in the green-room of a Greek theatre, showing an author (seated) directing an actor on the management of his hands
After mosaic found at Pompeii

Parliament here, in which the merchants were separately represented. It passed the statute of Acton Burnell, which made it lawful for a creditor to seize the goods of a man who would not pay his debts, and hold them until he did so.

Actor. One who, on the stage, impersonates and delivers the speeches of a character in a play. Unlike poet or author, the word

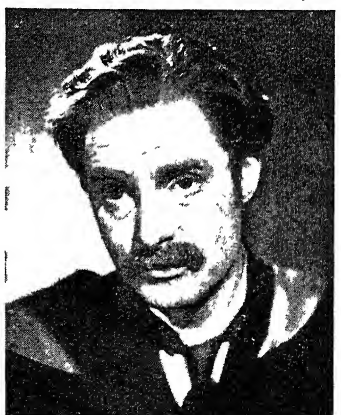
actor is still applied only to men. In ancient Greece, where women took part only in the chorus or as flute-players, and the production of plays was organized by the state, actors, as distinct from mimics, called themselves artists of Dionysus, were held in honour, and enjoyed special privileges. They were disguised in mask and buskin. Poets acted in their own plays. In Rome,

where the drama had no national importance, women's parts, except in mimes, were first played by men and boys; actors amassed money and influence—as Clodius Aesopus, in tragedy, and Roscius Gallus, in comedy, both friends of Cicero—but were debarred from citizenship and otherwise penalised by law. They were banished by Tiberius.

In Elizabethan and Jacobean England, actors not licensed after 1571 (14 Eliz. c. 2) were classed as rogues, vagabonds, and sturdy beggars. The more prominent actors were usually partners in the business of a theatre. To two, Heminge and Condell, we owe the first collected edition of Shakespeare's plays; to another, Alleyn, the foundation of Dulwich College. The status of the actor remained more or less under a social cloud until the 19th century; to-day actors form a recognized profession in Britain and have societies, benevolent and other, for their common interests. Towards the end of 1918 an Actors' Association was formed as a trade union, to



Greek mask to intensify actor's voice



Actor. Robert Donat, in his film part of "Mr. Chips," grew old with great artistry. He is seen here first in his eager youth, then in his forties

obtain for all members of the profession a standard contract, to include a minimum wage and payment during rehearsals. *See* Acting; Drama; Equity.

Bibliography. The School of Abuse, S. Gosson, 1579; Apology for Actors, T. Heywood, 1612; *Histrio-Mastix*, W. Prynne, 1633; *Their Majesties' Servants*, J. Doran, 1865.

Actors' Benevolent Fund. Fund established in 1881 to provide for the systematic administration of the money annually given by actors and actresses and others for the relief of distressed members of the theatrical profession. Its offices are at Adam Street, Adelphi, London, W.C.

Actress. Female impersonator of women's parts in stage plays. Originally female rôles were acted by men and boys. Foreign companies which included actresses visited London early in the 17th century, and women of rank figured in Elizabethan and Jacobean court masques and pageants, but actresses, like movable scenery, were first introduced to the English stage at the Restoration, by Killigrew and Davenant, being later popularised by Betterton. Pepys saw actresses first in Jan., 1661, and noted on hearsay that one of Killigrew's productions was acted "by nothing but women." Mrs. Betterton (d. 1712) was the first notable English actress, and Edward Kynaston (d. 1706) the last celebrated English impersonator of female characters. Shakespeare has several allusions to the appearance of men and boys in women's parts, *e.g.* in the epilogue of *As You Like It* and in *Hamlet*, II, 2; and their rivalry enters largely into the famous stage quarrel of 1599-1601. *See* Acting; Drama.

Acts of the Apostles. Fifth book of the N.T., giving the earliest history of the Christian Church. The authorship was attributed by early writers to S. Luke, and this has never been seriously questioned except by F. C. Baur, whose theories are discredited. The author refers to a Gospel written by him; dedicates his work to Theophilus, to whom his Gospel was dedicated; and internal evidence shows that the Acts and the third Gospel were written by the same person. The date was probably about A.D. 65, as S. Paul's arrival in Rome is described, but his martyrdom is not recorded.

The first twelve of the chapters describe the rapid spread of Christianity after the Ascension

of Christ, and deal mainly with the Church in Palestine, with S. Peter as the dominant figure. The remainder of the work consists of a somewhat broken biography of S. Paul and an account of his missionary journeys. In many places in the second part the author writes in the first person plural, showing that he took part in the events; and this intermittent usage is quite consistent with what is known of S. Luke's life and association with S. Paul. The historical character of the Acts of the Apostles is not open to doubt. The references to it by the early Fathers are sufficient proof of its authenticity.

Bibliography. Of the many commentaries on the Acts, those by E. Ziller, Eng. trans. by J. Dare, 1876; R. D. Rackham, 1912; and J. A. Findlay, 1934, may be consulted with advantage.

Actuaries, THE INSTITUTE OF. Founded in 1848 and incorporated in 1884, this professional body exists to protect the interests of actuaries, and to extend and improve the methods of actuarial science. Members are entitled to the letters A.I.A. or F.I.A. The headquarters are at Staple Inn Buildings, Holborn, London, E.C. The Faculty of Actuaries in Scotland has headquarters at 23, St. Andrew's Square, Edinburgh.

Actuary. Word of Roman origin, now mainly used to describe those who work out calculations for insurance companies and similar bodies. The large insurance companies usually have special staffs of actuaries, and they are also employed by Government departments, local authorities, transport undertakings, and building societies. In Rome the *actuarius* was a man who wrote down the *acta* of the senate, and the word was first used in England for a registrar or official of that kind. In 1819 the Friendly Societies Act mentioned an actuary, and with that the present position of the profession may be said to begin. Broadly, the function of the modern actuary is the application to practical problems of the theory of probability. The actuary employed by an insurance company deals with the calculation of premiums payable under new life assurance contracts and the valuation of liabilities under existing contracts, which involves long-term forecasts of the rate of mortality. By training and experience the actuary must be well versed in statistical and financial problems. *See* Insurance.

Acuña, CRISTOBAL (d. 1676). Spanish Jesuit. When working in S. America he explored the Amazon, and wrote a description of it. This was printed in 1640, and is now rare. He died in Peru.

Ada. Town in Bács-Bodrog co., formerly in the kingdom of Hungary, now in Yugoslavia. It is on the right bank of the river Tisza, 34 m. S.E. of Subotica, and is a farming centre in the Alföld. Pop. 13,000.

Ada-Bazar. Industrial town of Turkey. Situated 30 m. E. of Izmid on the river Sakaria, with a station on the Anatolian Rly., it is the see of an Armenian bishop, has silk, linen, and tobacco factories, and exports walnut-wood. Pop. about 20,000 (Christians 8,000).

Adad or HADAD. Storm god in Babylonian and Assyrian mythology. Controller of storm and flood and their consequence, famine, he was a power to be dreaded, or to be invoked for the overcoming of enemies. Under another of his names, Rammon, said to be the Rimmon of the O.T. (2 Kings 5), he is connected with the flood legends.

Adagio (Ital. *ad.*, at; *agio*, ease). Term in music meaning slow and leisurely.

Adair, JOHN (d. c. 1722). Scottish cartographer, appointed by the privy council in Scotland "to survey the shires" in 1683. He made over 20 maps. Specimens of his work are in the National Library of Scotland and the British Museum.

Adal. Former Arab kingdom. Inhabited by warlike, nomadic tribes, it was a Mahomedan state until occupied by France. The region is now included in French Somaliland, being a maritime district of E. Africa, between Eritrea and British Somaliland. It is indented by the Bay of Tajura, an arm of the Gulf of Aden.

Adalbert. Name of two saints. One, of Northumbrian birth, preached in Friesland, Germany, and the Low Countries, and is said to have been archdeacon of Utrecht. He was patron saint of Egmont, in Holland, where an abbey, destroyed by the Spaniards in 1573, was dedicated to him. He died June 25, 705. The other Adalbert, whose original name was Voitech or Voytech, was born about 939 at Prague, of which he became bishop in 983, and where lie his remains. He preached to the Hungarians, Poles and Prussians, and was assassinated by a pagan priest in Pomerania, April 23, 996.

Adalbert (d. 1072). German ecclesiastic. In 1045 he was appointed archbishop of Bremen, and in 1052 papal legate. He was a confidant of the emperor Henry III, and of the young emperor Henry IV. During the absence in Italy of Anno, or Hanno, archbishop of Cologne, Adalbert virtually ruled Germany. In 1066 he was dismissed from the court through the representation of a powerful coalition of nobles, but was recalled in 1069. He was buried in Bremen cathedral.

Adalia. Turkish port on the S. coast of Asia Minor, on the Gulf of Adalia, about 200 m. S.E. of Izmir. Timber, grain, cattle, and horses are exported, but its commercial importance has declined through inadequate harbour facilities. Founded by and named after Attalus II (220-138 B.C.), and known as Satalia to the Crusaders, Adalia, or Attalia, it figures prominently in the medieval history of the Levant. Here Richard I assembled his fleet before the conquest of Cyprus, and the Levant Company had an agency until 1825. Pop. 28,000. The vilayet of which Adalia is the chief town was formerly known by the same name, but is now called Antalya. It was the ancient Tekke. Pop. 256,366.

Adam. Biblical figure, the reputed progenitor of the human race. According to the Creation narrative in the first chapter of Genesis, on the sixth day "God created man in his own image, in the image of God created he him: male and female created he them" (v. 27). In the second chapter a similar account, though with some variations, is given.

"And the Lord God formed man of the dust of the ground, and breathed into his nostrils the breath of life, and man became a living soul" (v. 7).

According to the second narrative Adam was created first and Eve afterwards, because "it is not good that the man should be alone." They were placed in the Garden of Eden and given dominion over the rest of the animal creation. They were allowed to eat of the fruit of all the trees in Eden except the tree of knowledge, which they were forbidden to touch. The serpent, however, tempted them, and Eve succumbed, and afterwards induced her husband to partake of the forbidden fruit. For this act of disobedience they were driven out of Paradise and a curse was laid upon them.

The literal truth of this narrative, long accepted, has been questioned by modern criticism as irreconcilable with the facts of science, especially with 19th century developments in geology and biology. The story itself comes from two sources—the first chapter is taken from the Priestly Code, which dates from the 5th century B.C., the second chapter from the Jahvist document, which is usually assigned to the 8th century B.C. Many modern scholars regard the story as an allegory. Others think the writer is making use of ancient myths as a vehicle for conveying religious truth. On this theory, as Cheyne says, "It is not the mythic basis, but the infused idealism of the Eden story that constitutes its abiding interest for religious men." Similar narratives are found in most

mythologies, and some remarkable parallels have been discovered in the legends of Babylonia, Persia, and even Greece.

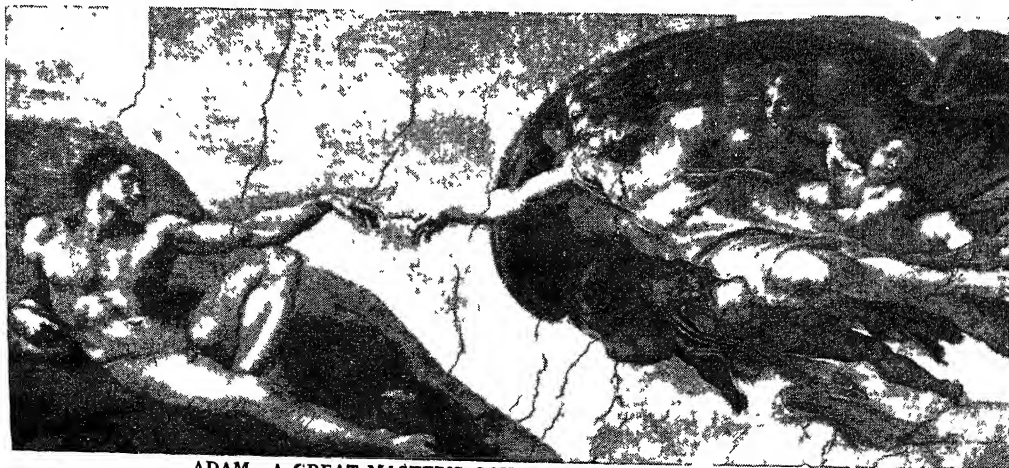
Adam Brothers, THE. British architects. Robert Adam (1728-92), the second son of William Adam, a Scottish architect, of Maryburgh, Fife, was the most celebrated of four brothers, John, Robert, James, and William. Born at Kirkcaldy and educated at Edinburgh University, he visited Italy in 1754 and studied the ancient buildings there, particularly the ruins of Diocletian's palace at Spalato (Split) in Dalmatia. Returning to England in 1762, he was appointed architect to George III, but resigned in favour of his brother James in 1768, when he became parliamentary candidate for Kinross-shire. In this year also he began with James to prepare the plans for



Robert Adam,
British architect

building the Adelphi (*q.v.*). The basis of this scheme was the raising of the river shore by a series of arches, on which were to be erected three good streets and a terrace fronting the Thames.

His other best-known works include the fine screen and gateway to the Admiralty building in Whitehall; Lansdowne House, Berkeley Square; Ken Wood House, Hampstead; Syon House, Isleworth; Glasgow Infirmary; the Register House, Edinburgh; Osterley House, Brentford; Harwood House, Yorkshire; Bowood, Wiltshire; Luton Hoo, Bedford-



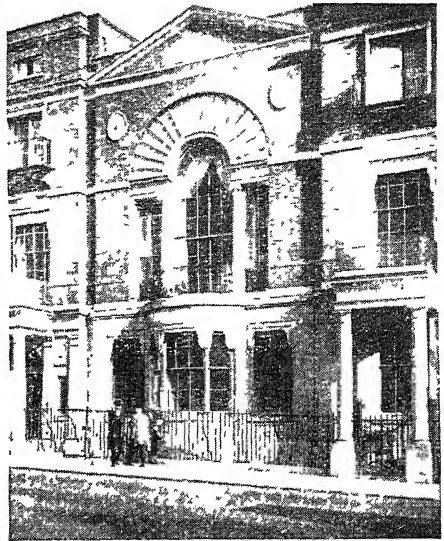
ADAM. A GREAT MASTER'S CONCEPTION OF THE BIBLE STORY
Ceiling painting by Michelangelo, Sistine Chapel, Rome

shire ; and Kedleston, Derbyshire. He imparted the unity of a single imposing structure to a number of private houses grouped in a block ; this system gave his town architecture great distinction, and his elegant, stucco-faced mansions in the streets of the west end of London were typical examples of his modified Greco-Roman style.

His architecture, however, was more than equalled by his achievements as a decorator of interiors. His ceilings, chimney-pieces, and staircases were designed with a lightness and grace that brought a new note into the application of classicism to domestic buildings, and has influenced interior decoration since his day. He also acquired some reputation as a landscape painter, and published with his brothers a series of engravings of their designs. He died in Albemarle Street, London,

father of the Adam brothers, was king's mason in Edinburgh, and was responsible for the design of the Royal Infirmary in that city, and of Hopetoun House. He died June 24, 1748.

ADAM STYLE. This is the name given to the style of furniture and household decoration first introduced by Robert Adam. It was based on recently found Greco-Roman architectural remains. Despite the introduction of arabesques, sphinxes, and griffins, extravagances were severely toned down. Prominence was given to conventionalized



Adam Style. Salon at Nostell Priory, Yorks., in a wing added by Robert Adam about 1770. The ceiling is in shades of pink, green, and cream. Top right, Boodle's Club, in St. James's Street, London. The lightness and grace so characteristic of an Adam interior are also apparent in this façade
Photo, "Country Life"

March 3, 1792, and was buried in Westminster Abbey.

His brother James was associated in most of the work undertaken by the Adams, particularly in London, during a partnership with Robert that lasted over 25 years. His individual achievements are not known, though Portland Place, London, is said to have been designed by him. He died Oct. 20, 1794. John Adam succeeded to his father's practice as an architect in Edinburgh ; William is reputed to have been a banker and an architect. Their Christian names were long perpetuated by streets in the Adelphi, London. William Adam,

floral, geometrical, and ribbon forms, often combined with the key, wave, fan, honeysuckle, and palm motifs, sometimes used as frames for medallions and panels containing figure or other paintings or designs in line relief. Such panels and medallions on walls, ceilings, and furniture were painted by Angelica Kauffmann, Zucchi, Pergolesi, and others. Colour schemes were subdued in tone, with half-tints prevailing. Furniture and fittings were designed to harmonize with the rooms, so that an Adam drawing-room is distinguishable by its unity.

In furniture, satinwood, amboyna, and various other light

woods were used in combination with mahogany. Everything was light and elegant, with a marked leaning towards straight lines. Legs of chairs and tables were tapered and usually lightly fluted. Carving was reduced to a minimum, reliance being mainly on outline and harmonizing tones. Consult *The Architecture of Robert and James Adam* (2 vols.), A. Baker, 1944.

Adam, JULIETTE (1836-1936). French authoress and publicist. Born Oct. 4, 1836, at Verberie, daughter of Dr. Lamber, she married in 1851 M. Lamassine, a lawyer, and in 1868 M. Edmond Adam, a senator (d. 1877). The leading woman writer in France for over fifty years, she founded a salon described as "the birthplace of the Republic." In 1879 she established *La Nouvelle Revue*, which she edited until 1899 ; under the name of Count Paul Vassili, she also wrote many works of travel, poetry, fiction, plays, criticism, biography, and politics. She did much to promote the Franco-Russian alliance and to keep alive



Juliette Adam,
French writer

the spirit of *revanche* after the defeat of 1870. She died in her hundredth year, Aug. 24, 1936. Consult *Mme. Adam, La Grande Française*, Winifred Stephens, 1917.

Adam de Ros. Anglo-Norman trouvère. Supposedly a member of a Norman family which settled in Yorkshire and Kent. He wrote a poem describing S. Paul's visit to hell with the Archangel Michael as his guide. "In this marvellous poem the whole of the Divina Commedia of Dante is anticipated and displayed" (Rowbotham). The poem is in the Cotton MSS., Vespasian, A.7, in the British Museum. See *The Troubadours and Courts of Love*, J. F. Rowbotham, 1895.

Adam of Bremen (c. 1045-75). German historian. Born in Saxony about 1045, he was a canon and teacher at Bremen from 1069 till his death, Oct. 12, 1075. His fame is based on his *Historia Hammenburgiensis Ecclesiae*, or *Gesta Pontificum Hammenburgiensium*, a history of the see of Hamburg from 784 to the death of Archbishop Adalbert in 1072. Besides containing records of ecclesiastical affairs, the work gives the earliest accounts of the Wends and of other Slavonic tribes, from knowledge gathered by the author during a visit to the Danish court.

Adamant (Gr. *a*, not; *damaein*, to tame). Word applied in the 3rd century B.C. to the emery stone of Naxos, then the hardest known crystalline stone. It was long a synonym for the lode-stone, and among scientists for the diamond. The term adamantine lustre is applied to the high refractive and dispersing properties of the diamond. Adamantine spar is a semi-transparent, light brown corundum, which exhibits the phenomena of asterism or a cluster of stars.

Adamawa. Territory in West Africa situated between Lake Chad and Cameroons. The greater portion lies within the colony taken from Germany in the First Great War, and the remainder, including Yola, the chief town, in Nigeria. The country is mountainous, especially in the south. The soil is extremely fertile, and good crops of cereals, cotton, and vegetables are produced. The palm and banana are extensively grown, and an active trade in ivory and rubber is carried on. See Cameroons.

Adam Bede. Novel by George Eliot, which established her reputation on its publication in 1859. It is a faithful picture of provincial life in the Warwickshire surroundings of her early years, and gives an idea of the tragedy and beauty to be found in the dull routine existence of a rustic population. It

deals with the love of Adam Bede for two women. The character who, according to Leslie Stephen, made the fortune of the book is Mrs. Poyser, the farmer's wife, a creation which stamps George Eliot as a humorist.

Adamello. Mt. of Italy, 11,661 ft. high, in the Lombard Alps. The chief peak of a great glacier region between the Val Camonica, on the W., and the Etschthal, or Adige Valley, on the E., it was first ascended in 1864 by Julius Payer. In April, 1916, Italian Alpini and Austrian troops fought bitterly for possession of the peak. The Italians were successful.

Adami, JOHN GEORGE (1862-1926). British pathologist. Born in Manchester, Jan. 12, 1862, he was educated at Owens College, Manchester, and afterwards at Cambridge and Paris. In 1892 he went to McGill University, Montreal, as professor of pathology and bacteriology. In Canada he took high rank in his profession, being president of the Association of American Physicians in 1911-12. Elected F.R.S. in 1905, he served during the Great War with the Canadian forces in Europe. In 1919 he was appointed vice-chancellor of Liverpool University. He wrote *Principles of Pathology*, 1908, and *The War Story of the Canadian Army Medical Corps*, 1918. He died Aug. 29, 1926.

Adamic, LOUIS (b. 1899). American writer. Born in the then Austrian province of Slovenia in 1899, he served in the U.S. army during the Great War and became a writer. His books include *Dynamite*, 1931, *Laughing in the Jungle*, 1932, *My America*, 1938, *Two-Way Passage* 1941, and *Dinner at the White House*, 1946.

Adamites. Name of several sects who prayed and worshipped in a state of nudity. The first, in Africa, was an obscure Gnostic sect of the 2nd century; another, in Antwerp, belonged to the 12th century; and a third, sometimes called Picards, after their Flemish founder, was exterminated by the Hussite general Ziska in 1421. They professed to revive the original innocence of Adam.

Adamnan, SAINT (624-704). Abbot of Iona. Born at Drumhome, Donegal, brought up in a monastery, and influenced theologically by the Venerable Bede, he became abbot of Iona in 679. The *Latin Life of S. Columba* attributed to him was edited by Dr. W. Reeves for the Irish Archaeological Society in 1857, and this, as translated by Bishop

Forbes of Brechin in 1875, is still considered the standard edition. Adamnan wrote a work on the Holy Places, based on experiences understood to have been communicated to him by Arculphus, a Gallic bishop shipwrecked on the British coast while returning from the Holy Land. He died Sept. 23, 704. See *An Irish Precursor of Dante*, C. S. Boswell, 1908.

Adams. Mt. in the Cascade Range of the Rocky Mountains. It is 12,470 ft. high, and is in the State of Washington overlooking the Columbia river.

Adams, FRANCIS WILLIAM LAUNDERDALE (1862-93). British revolutionary poet. Son of Professor Leith Adams, a Scottish scientist and army surgeon. He was born in Malta, Sept. 27, 1862, and spent his brief, unhappy life in England, Canada, and Australia, beset by physical infirmity and poverty. He was on the staff of *The Sydney Bulletin*, in which many of his verses appeared. He died at Margate, Sept. 4, 1893. Among his works are *Henry and other Tales*; a *Volume of Poems*, 1884; *Australian Essays*, 1886; *Poetical Works*, 1886; *Songs of the Army of the Night*, 1888.

Adams, FRANK DAWSON (1859-1942). Canadian geologist. Born at Montreal, Sept. 17, 1859, he was educated at the High School and McGill University, and afterwards at Yale and Heidelberg. Trained as a geologist, he became a member of the Geological Survey of Canada in 1880, and lecturer in geology at McGill in 1889. In 1894 he was appointed Logan professor of geology and dean of the faculty of applied science. An F.R.S., he wrote much on geology. He died Dec. 27, 1942.

Adams, GEORGE BURTON (1851-1925). American historian. Born at Fairfield, Vermont, June 3, 1851, he graduated at Beloit College, Wis., in 1873, and in due course became professor of history at Yale. He edited the *American Historical Review*, and wrote *Civilization During the Middle Ages*, 1894, *The Growth of the French Nation*, 1896, *European History*, 1899, *Origin of the English Constitution*, 1912, *The British Empire*, 1919, and a *Constitutional History of England*, 1921. He also edited *Select Documents of English Constitutional History*. He died May 26, 1925, at New Haven, Conn.

Adams, JAMES TRUSLOW (1878-1949). American historian. Born at Brooklyn, Oct. 18, 1878, he was educated at Yale and was in

business until 1912, though also engaged in literary work. During the First Great War he served in the intelligence department and helped Col. E. M. House (*q.v.*) to prepare material for the peace conference. His books include *The Founding of New England*, 1921, *Searchlight on America*, 1930, *The Epic of America*, 1931, *The Album of American History* (vol. 1, 1944). He was editor-in-chief of the *Dictionary of American History*, 1941.

Adams, JOHN (1735-1826). The second president of the U.S.A. Born Oct. 30, 1735, at Braintree, later Quincy, Massachusetts, he graduated at Harvard and became a lawyer. An ardent advocate of colonial rights, he protested in 1765 against the enforcement of the Stamp Act and the right of Britain to tax the colonists. As a delegate from Massachusetts, he was a member of the continental congress at Philadelphia in 1776, and proposed that the colonies should henceforward govern themselves. He helped to draft the Declaration of Independence, and was president of the Board of War in Washington's cabinet.



John Adams

As a commissioner from Congress, Adams repeatedly visited France and Holland, and was a member of the body which arranged the treaty of 1783 between Great Britain and the U.S.A. Two years later he was appointed minister to Great Britain, and in 1796 was a candidate for the presidency. He was supported by the Federalists and defeated his opponent, Thomas Jefferson, the Republican candidate. In 1800, however, the two were again candidates, and this time Adams was beaten. He retired to Quincy, where he died July 4, 1826. While in England Adams published his *Defence of the Constitution of the United States*, 1787. *See* Life of John Adams, C. F. Adams, 1871; John Adams, J. T. Morse, 1890.

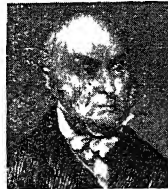
Adams, JOHN (c. 1760-1829). English seaman, mutineer and settler, whose real name was Alexander Smith. Under the lead of Fletcher Christian he took part in the mutiny on H.M.S. *Bounty*, April, 1789. Of the nine members of the crew who left Tahiti and, with Tahitian wives, settled on Pitcairn Island, he was in 1808 the

sole survivor and head of a prosperous little colony. Unmolested by the authorities, he died in 1829. *See* *Bounty*, Mutiny of the.

Adams, JOHN COUCH (1819-92). British astronomer. Born at Lan-east, near Launceston, Cornwall, June 5, 1819, he is famous for having predicted the existence of, and ultimately discovered, the planet Neptune. While working for the Cambridge trips in 1841, he was struck by the unaccountable anomalies in the motions of Uranus. After graduating as senior wrangler in 1843, he devoted himself to the study of these anomalies, working from the hypothesis that they were derived from a more distant and hitherto unknown planet. By Oct., 1845, he had approximately solved the inverse problem of perturbation on which he had been engaged, and submitted the result of his work to the Astronomer Royal.

Owing to delays in investigation at Greenwich and Cambridge, the credit of priority passed to the French astronomer, Leverrier, who had been engaged upon the same problems and worked out a hypothetical orbit for the disturbing planet. Leverrier's work was completed in the following June, and the planet was found by the German astronomer Galle on Sept. 23, 1846, very near the place assigned to it by Leverrier. It was observed at Cambridge six days later. Adams's name is also associated with investigations into the periodic reappearances of the Leonids, and the determination of 33½ years as their cycle. Adams became professor of astronomy (1858), and was director of the observatory, at Cambridge from 1860 until his death, Jan. 21, 1892.

Adams, JOHN QUINCY (1767-1848). Sixth president of the U.S.A. The son of John Adams, the second president, he was born July 11, 1767, at Quincy, Massachusetts. After studying at Paris, Leyden and Amsterdam, and holding a diplomatic post at St. Petersburg.



J. Q. Adams

he became professor of rhetoric at Harvard. Secretary to the commission which signed the treaty of peace between Great Britain and the U.S.A. in 1783, he was later minister to Holland and Prussia. He was sent by the state of Massachusetts to the

Senate, but resigned through differences with his constituents and became minister to Russia. In 1814 he was one of the negotiators of the treaty with Great Britain which ended the war of 1812, and from 1814 to 1817 he was American minister in London.

Appointed in 1817 secretary of state under President Monroe, he was partly responsible for the purchase of Florida from Spain, and strongly supported the Monroe doctrine. He was a candidate for the presidency in 1824, when none of the four candidates secured the necessary majority. The House of Representatives had therefore to decide, and their choice fell upon Adams. Defeated on offering himself for re-election in 1828, in 1831 he entered the House of Representatives, where he became a keen supporter of the emancipation of the slaves. He died of paralysis, Feb. 23, 1848. *See* John Quincy Adams, J. T. Morse, 1890.

Adams, MAUDE KISKADDEN (b. 1872). American actress. Born at Salt Lake City Nov. 11, 1872, both her parents being on the stage, she made her theatrical



Maude Adams, American actress

début in children's parts. After experience under the management variously of E. A. Sothern, C. Frohman, and John Drew, she made a hit in 1892 in *The Masked Ball*. This was followed by successes as Babbie in *The Little Minister*, 1898; Juliet, 1899; the Duke in *L'Aiglon*, 1900; Miss Phoebe in *Quality Street*, 1902; Peter Pan, 1905; and Rosalind in *As You Like It*, 1910. She played the title rôle in *Chantecler* in 1911, and the principal part in *The Legend of Leonora*, 1913-14. She retired in 1918, but returned to the stage to play Portia, 1931, and Maria in *Twelfth Night*, 1934.

Adams, SARAH FLOWER (1805-48). English poetess. Born at Great Harlow, Essex, Feb. 22, 1805, a daughter of Benjamin Flower, a political writer of radical views, she married William Bridges Adams, an inventor of some importance in the early days of railways. She wrote a number of hymns, of which the best known is *Nearer, my God, to Thee*. She died in August, 1848.

Adams, THOMAS. English divine. A preacher of great eloquence, he flourished between 1612

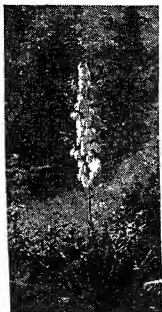
and 1653, leaving a bulk of printed sermons. These were republished in Nichol's Puritan Divines, 1862.

Adams, WILLIAM (c. 1575-1620). English sailor and the first Englishman to settle in Japan. Born at Gillingham, Kent, and acquainted with the sea from boyhood, Adams went, in 1598, as pilot on board the *Charity*, a Dutch vessel bound for India. The ship lost its way and, after some exciting adventures, the crew found themselves off the coast of Chile. Making their way across the Pacific, they reached Japan in April, 1600, and at Osaka Adams interviewed the ruler of that country, who gave him an income and an estate and kept him in Japan. Adams married and assisted in founding an English settlement on the island of Hirado. He died May 16, 1620. A monument to his memory was unveiled at Yokosuka in 1918. His story is told in the publications of the Hakluyt and Japan Societies. *Consult* Will Adams; The First Englishman in Japan, W. Dalton, 1861.

Adam's Apple (Lat. *Pomum Adami*). Protuberance of the larynx seen in the front of the neck. *See* Larynx.

Adam's Bridge. Chain of rocks and sandbanks, running N.W. to S.E. between Rameswaram Island, off the S. coast of Madras, and Manar Island, off the N.W. coast of Ceylon. At high tide the bridge, which is 17 m. long, is covered by a few feet of water. However, three winding and difficult channels have been dredged, enabling vessels to pass between the Gulf of Manar and Palk Strait. There is some evidence that Ceylon was once connected with the Indian mainland, through which, in 1480, it is said, the sea broke and formed the present bridge.

Adam's Needle. Popular name of the various species of yucca, also known as bear's grass and Spanish bayonet. They are handsome plants belonging to the lily family, and natives of America, from the southern United States to Central America. The long, thick, and mostly rigid sword-shaped leaves are borne in tufts or rosettes, and end



Adam's Needle, a species of yucca

usually in a spine, while the edges often bear slender threads. The large, drooping flowers are borne in a dense panicle several feet in length, and are succeeded by three valved pods. The leaves yield fibres from which cloth and cordage are made.



Adam's Peak. View from Maskeliya of the most celebrated mountain in Ceylon, on the summit of which is the reputed impression of Adam's foot

Adamson, PATRICK (1537-92). Scottish prelate. Born in Perth, during forty years he called himself variously Constayne, Constean, Consteane, Conston, Constant, or Constantine. Educated at St. Andrews University, after serving as minister of Ceres in Fife he went as a tutor in 1566 to France, where he was imprisoned for describing in a Latin poem the son of Mary Queen of Scots as lord of France and England. After hiding for seven months, owing to disturbed political conditions, he returned to Scotland and was appointed minister at Paisley and, in 1576, archbishop of St. Andrews. After a long contest with the Presbyterian party, he was excommunicated in 1586 and in 1588, and died a poor pensioner.

Adamson, WILLIAM (1863-1936). British politician. He began life as a miner in Fife and for 27 years worked in the pits. In 1902 he became assistant secretary of one of the unions of Scottish miners, and in 1908 its general secretary. He was M.P. for W. Fife from 1910 (Dec.) to 1931. In 1917 he was chosen chairman of the Parliamentary Labour Party, and in 1918 was made a member of the Privy Council. He was secretary for Scotland in two Labour administrations, those of 1924 and 1929-31. He died Feb. 23, 1936.

Adam's Peak. Mt. in Ceylon, 7,373 ft. in height. At the summit is an impression in the granite resembling a human foot, 5 ft. long and 2½ ft. broad. According to Arab tradition it was formed by Adam, who stood on one foot at this spot for a period variously

estimated at 200 or 1,000 years, to expiate his crime. The Hindus attribute the mark to Buddha. The mt., which is a place of pilgrimage, is 44 m. E. of Colombo.

Adana. Town of Turkey. The capital of the vilayet of Seyhan, it is on the Seihun Irmak, 42 m. by the Bagdad Rly. N.E. of the port of Mersin and near the Cilician Gates. The river bridge is a restoration of one attributed to Justinian. Wool, cotton, grain, timber, wine, and fruit are exported. Pop. 100,367.

Adaptation (Lat. *ad*, to; *aptare*, to fit). Biological process by which any living organism adjusts itself or is modified to suit the conditions of its existence. In order to survive it must achieve a more or less close adaptation to its surroundings; an obvious example is the dragon-fly whose larva is fitted for life in water while in the insect form its structure is adapted for life on land. Adaptations may be inherent in the germ cell, having probably been fixed by natural selection and transmitted by heredity. In animal evolution certain characteristics may tend to be developed or modified. If they are favourable to the survival of the species, such variations or mutations constitute a process of adaptation. *See* Evolution.

Adar. Twelfth month of the sacred, and 6th month of the civil, year of the Jews, corresponding to Feb.-March. The fast of Esther is observed on the 11th, and the feast of Purim or Lots on the 14th.

Adcock, ARTHUR ST. JOHN (1864-1930). British author and journalist. Born in London, Jan. 17, 1864, and well known as acting editor of *The Bookman*, he wrote more than 30 volumes of verse, fiction, essays, and London literary topography. He died June 9, 1930.

Adda. River of Italy, the ancient Addua. Length about 180 m. It rises in the Rhaetian Alps, flows S.W. through the Val Tellina, between the Rhaetian and Bergamasque Alps, and forms the lake of Como. Issuing thence, it traverses Lombardy and joins the Po 8 m. above Cremona.

Addams, JANE (1860-1935). American sociologist. Born in Cedarville, Illinois, Sept. 6, 1860, the daughter of a Quaker friend of Abraham Lincoln, she was educated at Rockford College, Illinois, and spent two years in Europe, in the course of which she studied conditions of poverty in the east end of London. On her return to the States she became a worker among the poor. In 1889, with Ellen Gates Starr, she helped to found Hull House, a social settlement in Chicago, on the lines of Toynbee Hall, London, and acted as its head resident. She was an ardent feminist and worker for international peace. In 1931 she shared the Nobel peace prize with Dr. N. M. Butler. Her books include *Democracy and Social Ethics*,



Jane Addams,
U.S. sociologist

Consult Life, J. W. Linn, 1935.

Addax (*Addax nasomaculatus*). Genus of African antelope related to the gemsbok. It has fine ringed horns, sometimes nearly a yard long, which twist in an open spiral in both sexes. Found in N. Africa and Arabia, and an animal of the desert, it is a little over 3 ft. in height, has a tuft of hair on the forehead, and develops a fine mane in winter.

Addenbrooke, JOHN (1680-1719). English physician. He was born at Swinford Regis in Staf-

fordshire, and educated at Catherine Hall, Cambridge. The extent of his medical practice is unrecorded, but at his death he left the sum of £4,000 for the founding of "a small physical hospital" in Cambridge. Addenbrooke's Hospital has long been an important adjunct of the medical school of Cambridge, besides being of direct service to the town and neighbourhood. An essay on Freethinking, written by Addenbrooke, was published in 1714.

Adder or **VIPER** (*Vipera berus*). Venomous snake, the only one in Great Britain. The word is really nadder, a nadder being corrupted



Adder. Close view of a large specimen of Britain's one venomous snake

into an adder, as a napron into an apron. It is found in every county in England, Scotland, and Wales, in varying numbers, but, like other snakes, is absent from Ireland. It is the only snake known in Scotland, with the exception of one or two examples of the ring snake in Roxburgh. It is common in some parts of Wales, in S. England, and the N. of Scotland.

The average size of adult vipers in Great Britain is from 20 ins. to 25 ins. A smaller variety, known as the small red viper, averages from 10 ins. to 12 ins. in length. The adder is distinguished by its flattened head, upon which are two dark bands converging in the form of a V. Along the back there is a dark zig-zag line, and along the sides are two rows of dark patches, one on each side. Its food consists of mice, slow-worms or other lizards, young birds, newts, and water-voles.

The females are slightly larger than the males as a rule, less brilliantly coloured, and can be distinguished by their shorter tail, which is much more obviously an appendage than in the male. The upper jaw carries the poison

fangs, about $\frac{1}{2}$ in. in length, pointing backwards into the throat. Their mechanism is that of other members of the same family of serpents. The reproduction is viviparous, the young being born alive, usually ten to thirteen.

The bite of the adder is rarely fatal, except in the cases of young children and persons in ill health. The most important consideration is to prevent the poison from getting into the system. This may be done by instantly ligaturing the affected part, by the tight tying of a piece of string, or by compressing the veins forcibly. The wound should then be strongly sucked until it bleeds profusely. This is quite safe, provided that the lips or tongue are not cracked or sore. Strong ammonia and caustics should be applied to the seat of the injury, or it may be burnt with a red-hot coal. Slightly cutting the place with the point of a pen-knife will assist bleeding. The patient must be kept cheerful. In all cases medical assistance should be obtained at once.

Adder's Tongue Fern (*Ophioglossum vulgatum*). This British fern lacks the typical frond. Each year a single leaf is produced which is divided into



Adder's Tongue,
a pasture fern

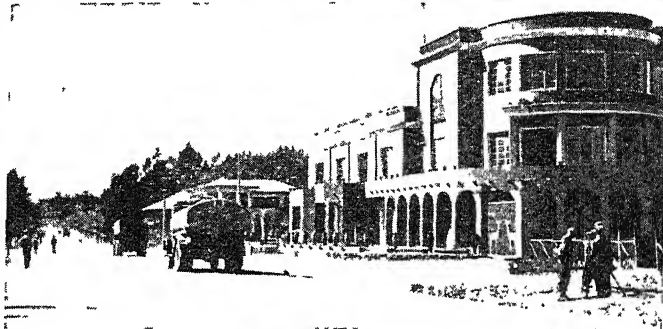
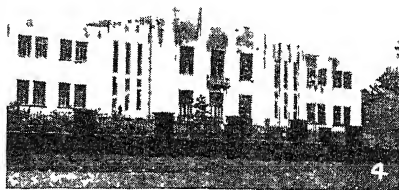
two parts: a smooth, leathery, oval blade, 3 ins. or 4 ins. long, and an erect, unbranched spike bearing a double row of capsules which contain the spores. It is much more plentiful than is commonly supposed, growing inconspicuously among grass in damp pastures.

Adding Machine. Name for machine used in mechanical accounting in offices and banks. See *Calculating Machines*.

Addington. Village in Surrey, now included in the county borough of Croydon. Here is Addington palace, built in 1772, a residence of the archbishops of Canterbury from 1808 until 1902. Then remodelled by Norman Shaw, R.A., it later became a country club with a golf course adjoining. Some of the 1,200 acres of the estate were developed for housing. Another Addington is in Kent, 7 m. from Maidstone; in the park are Celtic remains.

Addis Ababa. Capital of Abyssinia. Standing among the Eutoto mts. at an alt. of over 8,000 ft., 225 m. W. by S. of Harar, it consisted until recent years of villages and suburbs grouped round a royal palace, a scattered collection of unimposing buildings enclosed by walls. Founded in 1885, Addis Ababa ("new flower") was made the capital in 1896 by Menelek II, who planted extensive woods of eucalyptus in and around the town. A rly. from Addis Ababa to Jibuti in French Somaliland was completed in 1928. Under Haile Selassie (*q.v.*) parts of the town were considerably modernized, he himself building a new royal palace in the European style. On May 1, 1936, at the climax of the Italo-Abyssinian war, as Badoglio approached Addis Ababa at the head of a mechanized column, Haile Selassie fled from his capital

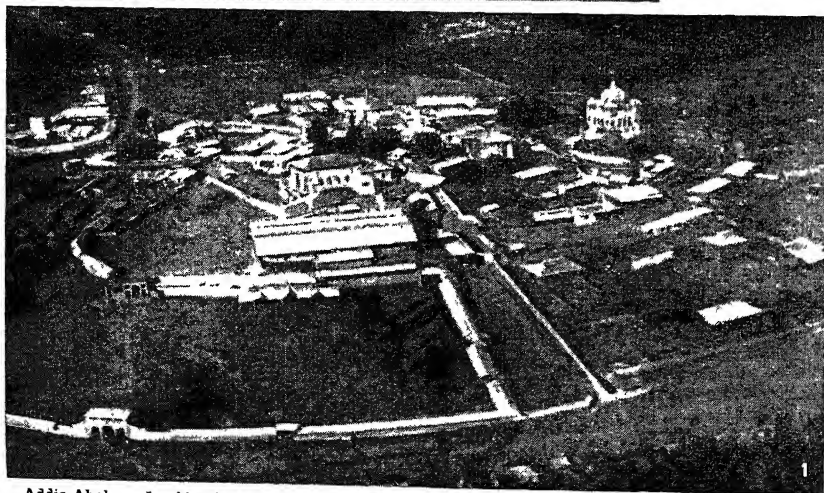
and dangerous rioting broke out in the streets, resulting in damage by pilage and fire. The rly. station was occupied on May 3 by some 50 French citizens, who defended it with machine-guns. The Italians entered the town on May 5.



During the five years of Italian occupation many imposing buildings of modern European design transformed the appearance of the town, together with broad asphalted streets, Italian shops and cinemas, the premises of Fascist organizations, and new colonial offices. Sanitation, lighting, and other public services were greatly improved. During a Fascist ceremony at Addis Ababa in March, 1937, bombs were thrown, causing injuries to the viceroy, Graziani, as well as to the Archbishop of Addis Ababa. Severe punitive measures were taken officially, some 2,000 arrests being made;

but unofficial reprisals on a large scale were also made by Italian workmen, who massacred a number of inhabitants indiscriminately. Graziani expelled many of those responsible for the massacre.

As Abyssinia was the first country to be liberated of those occupied by Fascist or Nazi forces, so Addis Ababa was the first capital to be liberated. It was recaptured by British and patriot forces on April 7, 1941, and the emperor



Addis Ababa. 1. Air view showing the Gibbi, or Imperial Palace; the domed building on the right is the mausoleum of Menelik II. The new palace is outside the town. 2. Ras Makonnen Street. 3. Modern thoroughfare built under Italian occupation and named Mussolini Street. 4. Parliament House, where the emperor re-opened his parliament on Nov. 2, 1942

re-entered the town in state on May 5, the fifth anniversary of its fall. Pop. about 150,000. See Abyssinia; East African Campaign; Haile Selassie.

Addiscombe. Eccles. district of Surrey, England. It is a residential suburb of Croydon, with a station on the S.R. From 1812 to 1861 the East India Company had a college here for instruction in preparation for the scientific branches of the Indian army.

Addison, CHRISTOPHER, 1ST VISCOUNT (b. 1869). British politician. Born at Hogsthorpe, Lincolnshire, June 19, 1869, he was educated at Harrogate and St. Bartholomew's Hospital, London. He was for a time editor of *The Quarterly Medical Journal*. He entered parliament as Liberal M.P. for Hoxton in 1910, and was appointed parliamentary secretary to the board of Education in 1914, minister of munitions in 1916, and head of a new ministry of reconstruction in 1917. Transferred to the local government board in 1919, he became the first minister of Health that year. This post he resigned in 1921 after his housing scheme had been widely criticized, and became minister without portfolio until he lost his seat in the 1922 election. Joining the Labour party, he was M.P. for Swindon, 1929-31 and 1934-35, serving as minister of Agriculture, 1930-31. Created baron 1937, viscount 1945, and K.G. 1946, he was leader of the house of lords from 1945, Dominion Affairs (later Commonwealth Relations) secretary, 1945-47, becoming lord privy seal in 1947 and paymaster-general in 1948.

Addison, JOSEPH (1672-1719). English essayist, poet, and statesman. Son of Lancelot Addison, who became dean of Lichfield, he was born May 1, 1672, at Milston rectory, near Amesbury, Wiltshire. He went to schools at Amesbury and Lichfield; to the Charterhouse, where his friendship with Steele began, and in 1687 to Oxford, first to Queen's, and then to Magdalen, where he won distinction as a writer of Latin verse, graduated M.A. in 1693, and became a fellow of Magdalen in 1698. The elm-bordered walk by the Cherwell is named Addison's Walk. His earlier efforts in verse included commendatory lines to Dryden, a translation of the Fourth Georgic of Virgil, and a versified Account of the Greatest English Poets.

Through Dryden Addison was introduced to Congreve and Jacob

Tonson, the publisher; and through Congreve to the Whig statesman, Charles Montague, afterwards Lord Halifax, who induced him to abandon the idea of taking orders, and secured for



Jo. Addison
Painting by Kraemer

him a state pension in order that he might qualify by travel for political service. There was at the time keen rivalry between Tories and Whigs to secure young recruits of talent and promise. Leaving England in 1699, Addison spent nearly four years in France, Italy, Austria, Switzerland, Holland, and Germany. In Paris he met Boileau and Malebranche; at a carnival in Venice he saw a crude play on the subject of Cato, which suggested his own play.

When he returned to England at the close of 1703 in straitened circumstances, Tonson introduced him to the Whig coterie known as the Kit-Cat Club, and through Halifax he was commissioned to write a poem in celebration of the victory of Blenheim. This poem, *The Campaign*, 1704, secured for him the succession to John Locke as a commissioner of excise and an under-secretaryship of state. In 1705 he went with Halifax to Hanover. In the same year he published his *Remarks on Several Parts of Italy*. His *Fair Rosamond*, an unsuccessful opera, followed in 1706, and in 1708 he was returned M.P. for Lostwithiel, an election later declared invalid. In 1708 he went as chief secretary to Ireland, where he made many friends, including Swift, and sat in the Irish Parliament as member for Cavan. In 1710 he became M.P. for Malmesbury.

Collaboration with Steele on *The Tatler* led to the foundation by them of *The Spectator*. 1711-14, on his essays in which, and especially his portrait of Sir Roger de Coverley, his literary

fame mainly depends, though his papers in *The Guardian*, *Freeholder*, and *Old Whig* are also noteworthy. His *Cato: a Tragedy*, proved for political reasons a great success in 1713, and in 1714, on Anne's death, he became secretary to the regency. In 1715 he was again in Ireland as chief secretary, and in 1716 was appointed a commissioner for trade and colonies. On Aug. 3, 1716, he married Charlotte countess of Warwick, whose neighbour he was when he occupied Nell Gwyn's old house at Chelsea. From April, 1717, to March, 1718, he was a secretary of state, and he died of asthma and dropsy at Holland House, June 17, 1719, leaving by his marriage with the countess of Warwick (d. 1731) a daughter, Charlotte, who died unmarried in 1797. His last words, addressed to his stepson, were: "See in what peace a Christian can die." He was buried in Westminster Abbey, where a monument to him was erected in 1809.

Politically Addison's integrity was without stain, his temper ever equable; his principles were unchanging. He was popular alike with statesmen and habitués of coffee-house and club. As a writer he helped to found modern English prose and establish a public opinion, while the continuity of his personal studies in *The Spectator* foreshadowed the English novel. Gifted with wit, satire, and insight, he laughed vice out of court and made open violation of decency once for all the mark of a fool. His friendships were many. He had one serious quarrel, fastened upon him by Pope, and a regrettable political difference with Steele, but in neither case did he allow vexation to rob him of good temper. Pope's lines on Atticus, the attack on Cato by John Dennis, and Bernard Mandeville's phrase, "a parson in a tie-wig," were the severest things said of him by contemporaries. His religious sincerity is shown in several hymns, including "When all Thy mercies, O my God."

W. F. Aitken

Bibliography. Works, Bohn, 6 vols., 1856; Lives, W. J. Courthope 1884; Johnson, *Lives of the Poets*; Macaulay, *Essays*; Thackeray's *English Humourists of the Eighteenth Century*

Addison's Disease. Constitutional disease associated with changes in the supra-renal capsules or small glands attached to the kidneys. The most frequent cause is tuberculosis of these glands. The disease begins with symptoms of weakness and

languor, followed by irritability of the stomach, feebleness of the heart, and pigmentation of the skin, which is often the first symptom to attract attention. Death may occur from heart-failure or from development of tuberculosis. Medical treatment may afford relief, but is of little avail to cure the disease, which was named after Dr. Thomas Addison (1793-1860), for many years a physician and lecturer at Guy's hospital, London.

Addition. Process of uniting two or more numbers or symbols in one sum. Simple addition is the adding of numbers, irrespective of the things denoted by them, or the adding of sums of the same denomination. Compound addition in arithmetic is the adding of sums of different denominations, as of pounds, shillings, and pence. This addition of all kinds of multiple quantities or symbols is performed according to the principles of compound addition. Thus, the addition of two algebraic imaginary quantities is effected by adding the real parts of the expressions to obtain the new real part, and the imaginary parts to obtain the new imaginary part.

Additional Forces Act. Act passed by the British Parliament in 1804 to stimulate recruiting. Every parish had to find men or pay a heavy fine. The United Kingdom was divided into districts of such size as would furnish 3,000 men. An infantry regiment was affiliated to each district, and the intention was to feed this regiment from the local levy. County battalions thus raised were for home service, but the men, when trained, were induced by bounties to transfer to the regular regiment, or first battalion. Opposition to compulsion caused the Act to be repealed after Pitt's death in 1806.

Added Parliament. Name given to the Parliament which met in April, 1614, after James I had reigned without one for three years. A number of men called undertakers undertook to induce the members to grant the king the money he needed. But as the members refused any grant until James had surrendered his right to increase certain duties, the Parliament was dissolved in June. It had done nothing, hence its name.

Addlestone. Ecclesiastical district and village in Surrey, England, $1\frac{1}{2}$ m. S.E. of Chertsey by railway. Here are the Princess Mary Village Homes for young girls. Pop. 9,676.

Adorsed OR **ENDORSED** (Lat. *ad*, to; *dorsum*, back). In heraldry, two charges placed back to back. The term is also applied to wings elevated and touching.

Address, FORMS OF. In formally addressing persons of rank or office the following styles are adopted in British usage; *e* standing for address on envelope, *l* for commencement of letter, and *p* for personal address in speech.

ROYALTY. The King: *e.* The King's Most Excellent Majesty; *l.* and *p.* Sire, contracted to Sir. The Queen: *e.* The Queen's Most Excellent Majesty; *l.* and *p.* Madam, contracted in speech to Ma'am. Prince: *e.* His Royal Highness Prince —; *l.* and *p.* Sir. Princess: *e.* Her Royal Highness Princess —; *l.* and *p.* Madam.

NOBILITY. Duke: *e.* His Grace the Duke of —; *l.* My Lord Duke; *p.* Your Grace. Duchess: *e.* Her Grace the Duchess of —; *l.* and *p.* Madam, or Your Grace. Marquess: *e.* The Most Hon. the Marquess of —; *l.* My Lord Marquess; *p.* My Lord. Earl, Viscount, and Baron: *e.* The Rt. Hon. the Earl of —, the Rt. Hon. Viscount —, The Rt. Hon. Lord —; *l.* and *p.* My Lord.

ECCLESIASTICAL. Archbishop: *e.* His Grace the Lord Archbishop of —; *l.* My Lord Archbishop; *p.* Your Grace. The wife of an archbishop or bishop has neither rank nor title, and is plain Mrs. —. Bishop: *e.* The Right Rev. the Lord Bishop of —; *l.* and *p.* My Lord. For a retired bishop: *e.* The Right Rev. Bishop Brown, or whatever the surname may be, and only in personal conversation is the title My Lord retained. Cardinal: *e.* His Eminence Cardinal —; *l.* and *p.* Your Eminence. Archdeacon: *e.* The Venerable the Archdeacon of —; *l.* and *p.* Venerable Sir. Dean: *e.* The Very Rev. the Dean of —; *l.* Very Rev. Sir, or Mr. Dean; *p.* Mr. Dean. (No title on retirement.) Clergymen generally: *e.* The Rev. A. B.; *l.* and *p.* Rev. Sir. In the case of Roman Catholic clergy, it is customary to add Father to Rev.

LEGAL. Lord Chancellor: *e.* The Rt. Hon. the Lord High Chancellor; *l.* and *p.* My Lord. Judge of the High Court: *e.* The Hon. Sir A. B.; *l.* Sir; *p.* My Lord, but in court only. County Court Judge: *e.* His Honour Judge A.; *l.* Sir; *p.* Your Honour, but in court only. Magistrate: *e.* J.P. after the surname; *l.* and *p.* Sir, and Your Worship. Recorder: *e.* The Wor-

shipful (of London the Rt. Worshipful) the Recorder of —; *l.* and *p.* Sir, and Your Worship. Sheriff of London: as Recorder of London.

MUNICIPAL. Lord Mayor: *e.* The Rt. Hon. the Lord Mayor of —; *l.* and *p.* My Lord. Lady Mayoress: *e.* The Rt. Hon. the Lady Mayoress; *l.* and *p.* Madam or My Lady. Lord Provost: *e.* The Rt. Hon. the Lord Provost of —; *l.* and *p.* My Lord. The wife of a Lord Provost has neither rank nor title. Mayor: *e.* The Worshipful the Mayor of —; *l.* and *p.* Sir.

MISCELLANEOUS. Ambassador: *e.* His Excellency — Ambassador to the Court of —; *l.* and *p.* Your Excellency. The wife of an ambassador has no title.

Addressing Machine. Apparatus by which printed or typewritten matter such as names and addresses on envelopes or wrappers, names and details on forms, pay rolls, renewal and receipt notices, municipal demand notes, and many other varieties of listed matter can be printed. The main characteristic is the capacity to print long series of names and facts in desired sequences at speeds up to 5,000 per hour. In one machine, the Addressograph, embossed metal address plates are used which form complete reproducing indexed units. They are printed on hand or electric power ribbon printing machines. In another system, the Elliott, the stencils from which the addressing is done can be prepared on a typewriter. For a works pay sheet, for instance, 250 stencils at a time are printed rapidly on sheets of any length.

Address to the Crown. In Great Britain each session of Parliament is opened by the sovereign or his deputy with a speech. To this both Houses return addresses of thanks, which are usually made the occasion of important debates, especially in the Commons. The form observed in recent years is for two private members to move and second the Address, humbly thanking the sovereign for his gracious speech, and then for the leader of the Opposition to rise and deal with the policy of the Government. The leader of the Government having replied to these remarks, and if necessary defended himself and his colleagues, the debate becomes general. By moving amendments to the Address members are enabled to ventilate real or imaginary grievances, and to bring up questions for discussion. When,



Adelaide. King William Street, the fine thoroughfare which runs through the centre of the city from S. Peter's Cathedral to South Terrace

after a week or more of discussion, the Address is voted, it is taken to the sovereign, who returns thanks to the Lords by the Lord Steward, and to the Commons by the Comptroller of the Household. The two Houses also address the sovereign on occasions of special joy or sorrow, such as a birth or death in the royal circle, an escape from death, or a recovery from illness.

This privilege of addressing the sovereign goes back to the origin of Parliament under Henry III and Edward I, and was for long used in a less formal manner than is the case to-day. In the reign of Elizabeth, for instance, Parliament addressed her, urging her marriage and a settlement of the succession; the Petition of Right was an address to Charles I, and George III was the recipient of others. As, however, power passed from the king to his ministers, this method of drawing attention to grievances became less necessary. See Parliament; King's Speech.

Adelaer OR KURT SIVERTSEN (1622-75). Scandinavian seaman. Norwegian by birth, Sivertsen became a sailor, first in the Dutch navy and then in that of Venice, for whom he fought with distinction against the Turks. In 1654, with a single vessel, he seriously damaged the Turkish fleet in the Dardanelles, and compelled the Turks to surrender at Tenedos. In 1662 he took command of the Danish fleet, retaining this post until his death, Nov. 5, 1675. His name of Adelaer, or the eagle, was given him by the Danes.

Adelaide. Capital of South Australia. It stands near St. Vincent Gulf, 7 m. by rly. S.E. of Port Adelaide. The city, founded in 1836, and named after the queen of William IV, is divided into North and South Adelaide,

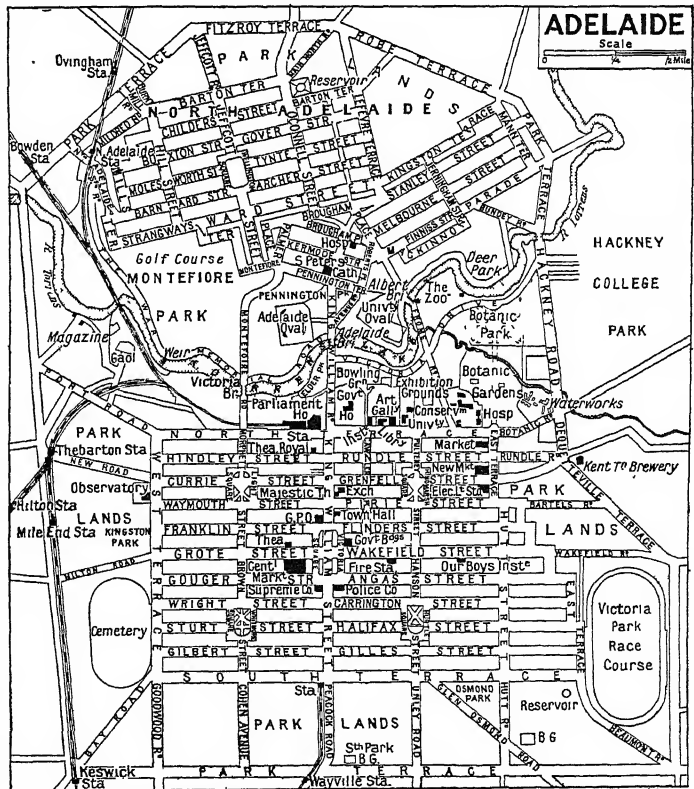
the latter being the commercial portion, by the Torrens river. An important station on the Australian railway system, it is situated on a plain, overlooked on the E. and S. by the Mount Lofty range, which rises between 4 m. and 8 m. beyond the town. The Torrens, crossed here by four bridges, has been converted by a dam into an extensive lake.

On the wide, regular streets,

laid out in a "grid" formation, stand many imposing buildings—the government house, parliament house, town hall, South Australian institute, jubilee exhibition building (1887), and hospital.

Adelaide is the seat of an Anglican and a Roman Catholic bishopric, with cathedrals dedicated respectively to S. Peter and S. Francis Xavier, its chief educational institutions being the university and a school of mines and industries. A number of fine statues includes one of Robert Burns and copies of Canova's Venus and the Farnese Hercules. The Botanic Gardens have an area of 40 acres, and the adjoining Botanic Park and Zoological Gardens are 85 acres in extent.

There are also extensive parks and parklands on the outskirts, forming a green belt one mile broad, the suburbs being built on the far side. At Marble Hill, 12 m. distant, in the Mount Lofty range, is the vice-regal summer residence. Adelaide, which claims to be free of slums, is the



Adelaide. Ground plan of the Queen City of South Australia, which is celebrated for its magnificent situation and its broad and regularly laid-out streets

trade centre of South Australia, its chief exports consisting of wheat, flour, wool, wine, and copper, its manufactures include leather, iron, steel, and woollen goods. Pop 366,000

Adelaide Town of Cape Province, S Africa. It is on the Koonap river, 90 m by rly W N W of King William's Town. Situated in mountainous country, it is a prosperous commercial centre, and holds regular stock fairs. The neighbouring district is noted for merino wool. The Great Winterberg, 6,819 ft., rises 20 m to the N. Pop 9,941

Adelaide, in full AMELIA ADELAIDE LOUISA THERESA CAROLINE (1792-1849) Queen of William IV. The eldest child of George, duke of Saxe-Coburg-Meiningen, she married in 1818 William, duke of Clarence, who in 1830 became king of Great Britain and Ireland as William IV. Her alleged meddling with politics made her very unpopular. After nursing the king in his last



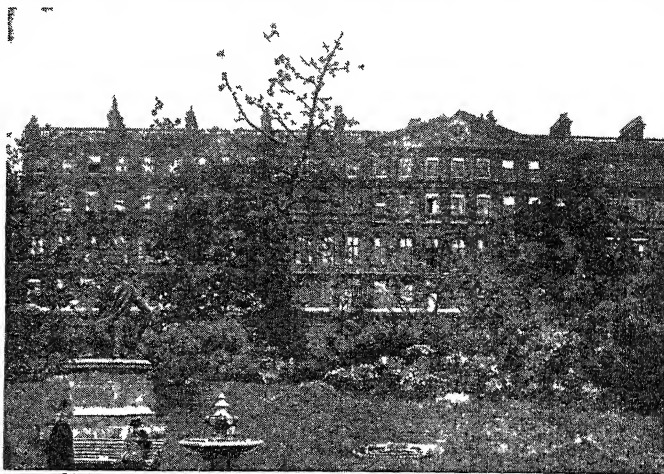
Adelaide

illness her health broke down, and she spent a winter in Malta, where she built the church of St Paul at Valetta. She died at Bentley Priory, near Stanmore, Middlesex, Dec 2, 1849.

Adelaide University. Established in 1874 to serve as the university of South Australia. It has over 1,500 students.

Adelboden. Village and health resort of Switzerland, in the Bernese Oberland. In the canton of Berne, it lies in the Adelboden valley, 10 m by road (diligence) S of Frutigen, on the rly from Thun. It has mineral springs, an old church (1433) and timbered houses. Beautifully situated at an alt of 4,445 ft to 4,595 ft, it commands fine views of the surrounding mountains.

Adeler, MAX (1841-1915) American humorist, whose real name was Charles Heber Clark. Born in Berlin, Maryland, July 11, 1841, he was the son of a clergyman. He is famous as the author of *Out of the Hurly Burly* (1874), the boisterous humour of which made him popular with young people in America and Great Britain. Elbow Room and Ran-



The old Adelphi Terrace, London, before its demolition in 1936. It was modelled on the palace of Diocletian in Dalmatia, and was built by the Adam brothers.

dom Shots are among other works which testify to his command of high spirits and rollicking fun. He died Aug 10, 1915.

Adelie Land. Part of the Antarctic mainland lying approximately in lat 66° 30' S and long 136° to 144° E. It was discovered by Dumont D'Urville in 1840, and was named by him after his wife. The coast was explored by the Australasian expedition of 1911-14.

Adelphi, THE (Gr *adelphoi*, brothers) Name of a locality in London, between the Strand and the Thames Embankment. It was created by the enterprise of the brothers Robert and James Adam, who in 1768 began to reclaim this part of the foreshore of the Thames for building purposes. They obtained parliamentary sanction in 1771 and by con-

structing the Adelphi Aches provided some raised ground on which they built Adelphi Terrace and the streets formerly named after the four Adam brothers (*gr*), James, William, John, and Robert. A wharf and storage room were provided with access from the Strand, and these were completely separated from the fine houses above. The terrace was pulled down in 1936, and was subsequently replaced by commercial buildings of the modern style.

Adelphi Theatre Playhouse in the Strand, London, long the recognized home of melodrama. The comedian, J. B. Buckstone, was a prolific writer of Adelphi drama, e.g. *The Dream at Sea*, *The Green Bushes* and *The Flowers of the Forest*, and William Terriss, murdered in 1897.



The new Adelphi Terrace, erected on the site of the old one (see above), consists of towering office structures in steel and concrete, and during the Second Great War was the headquarters of the Ministry of Supply.

was a popular Adelphi hero. Apart from melodrama, the Adelphi scored an enormous success in 1821 with Tom and Jerry, a version of Pierce Egan's *Life in London* depicting the adventures of Bob Logic, Corinthian Tom, and Jerry Hawthorn.

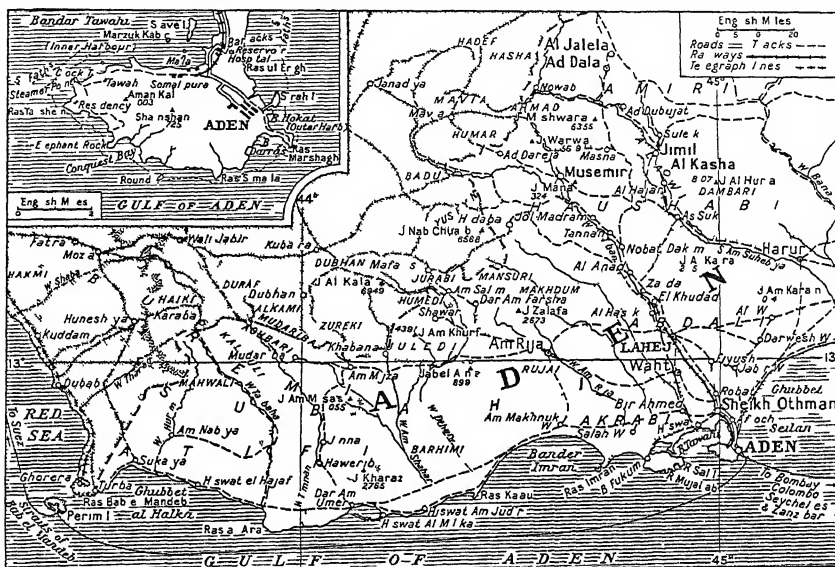
The theatre was built in 1806 by the inventor of "Old True Blue" wasp blue, John Scott, who with his daughter was indefatigable in working for its success. Until 1819 it was called the Sans Pareil. It was rebuilt in 1858, 1901, and 1930. For a few months after the reopening of 1901 it was known as the Century theatre.

Adem, EL
Italian desert outpost in Libya during the Second Great War Situated 18 m S of Tobruk, the site of a large air base, it was abandoned by the Italians in Jan, 1941, as the result of heavy British bombings After the British capture of Tobruk (Jan 22) the burnt out remains of 25 Italian bombers and 43 fighters were found at El Adem Captured by German and Italian forces in April, 1941, it became the scene of intense fighting between the British 8th army and the German Africa Korps in Nov and Dec, 1941 On Dec 9 S African and Indian troops reoccupied El Adem, and were joined there by men from the

Tobruk garrison In June, 1942, the line Tobruk-El Adem south ward, which the British tried to hold, was overrun, and the place remained in German hands until the 8th army's final advance in Cyrenaica, Oct-Nov, 1942

Aden. Town and territory near the entrance to the Red Sea. Built on a volcanic peninsula of

and has two harbours though only the inner harbour on the W side of the peninsula, is of commercial value. On the isthmus connecting Aden with the mainland are four salt works. The isthmus is a sandy flat just above sea level. Pans are excavated in the sand and sea water is let into them through sluices at the spring tides. The



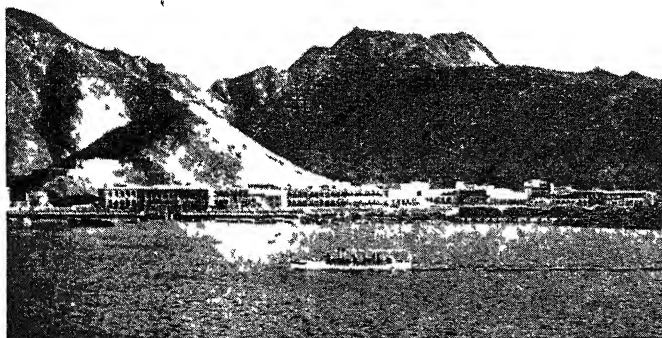
Aden Map of territory surrounding this important fortified British coaling station, with inset map of the peninsula on which the town itself is situated

the same name, 5 m long by 3 m broad, 105 m Γ of the Straits of Bab el Mandeb, the town is an important and strongly fortified coaling station and port of call for P & O and other liners on the seaway to and from India and was given a fresh significance by the construction of the Suez Canal. It is the capital of a settlement named after itself and of the Aden Protectorate, is a cable and wireless station,

water then evaporates. A deposit of about six inches of salt is thus obtained every two months.

The climate is hot, but not unhealthy. Water is scarce and is obtained chiefly from wells near Sheikh Othman, whence it is conducted for about 6 m through a 15 inch main. Practically all food stuffs have to be imported. The settlement has an area of 75 sq m and a pop. of about 80,516.

For many years Aden was administered from India, but since April 1, 1937, it has been a British crown colony. The islands of Perim and Kuria Muria off the Arabian coast, and Sokotra off the African coast form part of the colony, and the small island of Kamaran in the Red Sea, 200 m N of Perim, is also administered under the control of the government of Aden. The Protectorate, area about 112,000 sq m, comprises the region, mainly desert, between the kingdom of Yemen and the dominions of the sultan of Muscat and Oman, with a coastline 750 m long. It includes the Hadhramaut and a large part of the Rub al Khali (Sandy Desert). The popu-



Aden Water-front of Britain's key possession in the Middle East Behind it rise grim, waterless, volcanic hills

lation is estimated at 600,000, subjects of sheikhs in treaty relations with Britain.

The trade of Aden largely consists of transshipment. Oil, coffee, gums, hides, tobacco, grain, sugar, etc., are exported to an annual value of about £4,000,000; cotton and other commodities are imported, to an annual value of about £5,000,000.

Part of *Arabia Felix*, Aden was of considerable importance in Roman times. Unsuccessfully occupied by the Portuguese in 1513, it fell to the Turks in 1538, and was fortified by Solymán the Magnificent. Seized in 1735 by the sultan of Labej it was the object of many struggles until 1839, when it was annexed by Great Britain as a result of numerous outrages on British ships by the sultan and people of the native Arab state of Labej. Perim was occupied by the British in 1857. Sokotra has been a protectorate since 1886. The boundaries of the Aden protectorate, delimited in 1904, were extended by treaties in 1934 and 1938. A command of the R.A.F. was established at Aden in 1928, and during the Second Great War the area became the base for attacks on Italian E. Africa, 1940-41.

Aden, GULF OF. Arm of the Arabian Sea, between Arabia and Somaliland in Africa. Its length is about 500 m. and its greatest breadth about 200 m. It is connected with the Red Sea by the Straits of Bab-el-Mandeb.

Adenauer, KONRAD (b. 1876). German statesman. See N.V.

Adenoids (Gr. *aden*, gland; *eidos*, form). Overgrowth of the lymphoid tissue at the back of the nose, commonest between the ages of three and eighteen. The first effect of adenoids is to hinder or prevent breathing through the nose, and this, in its turn, leads to other and sometimes serious developments. The nose becomes thin and pinched, the mouth is kept open, and the teeth exposed, producing a very characteristic appearance; the palate is high and arched, and the whole chest may become misshapen. The growth may obstruct the Eustachian tubes and lead to deafness, or may set up serious inflammation of the ear. Children suffering from adenoids are frequently irritable and listless and backward at school. Adenoids if left untreated may produce effects often permanent through life, but the growth can be removed by a

surgical operation which is not dangerous, and is almost always satisfactory.

Adenoma. Name given to a tumour or new growth which arises in connexion with secreting glands and, in microscopic structure, simulates the tissue from which it is formed. Adenomata are most frequently found in the breast, prostate gland, kidney, intestine, rectum, skin (in connexion with sebaceous glands), salivary glands, lachrymal glands, nose, pharynx, uterus, and ovary. Sometimes there is a considerable development of fibrous tissue, the tumour then being termed "fibroadenoma." This variety is often found in the breast.

Adenomata are almost invariably non-malignant. Their growth is usually slow. An adenoma may cause no harm or inconvenience, but if it becomes large and begins to press on neighbouring organs, it can as a rule be removed.

Aderno. Town of Sicily, in Catania prov. At the S.W. foot of Mt. Etna, 22 m. by rly. N.W. of Catania, it has a Norman keep and a convent founded by Roger I in 1157. It is the ancient Hadranum, which was famed for its temple of the god Hadranos.

Adherence. Term used in English law. Throughout the British Dominions it is high treason, punishable with death, whether within or without the realm, to adhere to the king's enemies. Such adherence means actively assisting an enemy at war with His Majesty.

Adhesions. Depositions of fibrous tissue, as a response to inflammation or injury, glueing together structures of the body which would otherwise have free range of movement. Adhesions are often found in the lung attaching the pleural membrane to the diaphragm, or in the heart binding the two layers of the pericardium; but the term is perhaps most frequently used to describe bands of fibrous tissue forming in the peritoneal cavity of the abdomen after operation or infection and interfering with the normal movement of the gut. They are a frequent cause of obstruction of the bowel, when they must be severed by the surgeon without delay. If they only cause discomfort and do not endanger life, it is generally wiser to leave adhesive bands unsevered. X-ray examination helps in determining the wisest treatment.

Adiabatic (Gr. *adiabatos*, not passed through). Term used to

denote the state of a gas or any other body, when no heat enters or leaves it. When a gas is compressed it becomes heated, but when pressure is taken off the gas cools. The adiabatic expansion of a gas in a closed space, therefore, implies a fall of its temperature, and this principle is made use of in obtaining very low temperatures. That is to say, when a gas has been cooled to the point at which it liquefies, a still lower temperature can be reached by taking pressure from the gas. The gas then adiabatically expands and its temperature is lowered in the process. The principle is employed in gas turbine engines.

Adiaphora (Gr. things indifferent). Term formerly applied by the Stoics to things on the borderland between good and evil. It became the pivot of a bitter controversy in 16th century Germany, when Charles V, by the Augsburg Interim, 1548, sought to effect a compromise between Protestants and Roman Catholics. The latter refused to regard any of the tenets of their Church as among adiaphora.

Adige. River of Italy, the ancient Athesis. Its length is about 240 m. Rising in Tirol, in the Rhaetian Alps, and flowing past Merano, Bolzano, Trent, Roveredo, Verona, Legnago, and Rovigo, it enters the Adriatic S. of Chioggia. Swift and subject to floods, it is with difficulty navigable upstream as far as Trent. It figured largely in the battles between Italy and Austria, 1915-16, and was crossed by the British 8th army in the final phases of the battle for Italy, April, 1945. *Pron.* Ah-dee-jay.

Adi-Granth. Sacred book of the Sikhs. It embodies the teaching of Nanak (1469-1539), founder of the Sikh religion, as collected by Arjan (1581-1606), fourth of his successors. A second Book was added by Govind Singh (1675-1708) in 1696.

Adipocere (Lat. *adeps*, fat; *cera*, wax). Wax-like substance formed in the process of decomposition of fatty animal matter, particularly in bodies buried in wet soil or immersed in water. In Great Britain adipocere takes from eight to twelve months to form in any quantity, but in hot countries the process is more rapid. When formed, adipocere remains unchanged for an indefinite period. Kegs of butter buried in the marshes in Scotland during the wars of the 17th century have been found completely converted into adipocere.

Adirondack Mountains. A group of mts. situated in the N.E. of the state of New York, U.S.A. Lying between Lake Champlain, E., and the St. Lawrence, W., it forms part of the Appalachian system. The head streams of the Hudson river take their rise in these picturesque mts. Numerous small lakes, many of them over 1,500 ft. above sea level, afford excellent fishing, and there are extensive forests of pine, birch, beech, etc., about 4,000 sq. m. of which have been constituted a state reserve. The region, especially Keene Valley, is a favourite hunting and tourist resort, and several sanatoria are established there for the treatment of lung diseases. There are rich deposits of magnetic iron-ore. The highest summit is Mt. Marcy or Tahawus, 5,385 ft. See Appalachian Mts.

Adit (Lat. *aditus*, entrance). Opening driven into a mine horizontally, not, as a shaft, vertically. Adits are generally driven on a slight up-gradient to allow of a ready flow of water, their principal purpose being for drainage, although they are also used for ventilation. In mining districts very long adits have been driven which serve to drain such districts of water, and effect immense economies in dealing with mine water.

Ancient mining was carried out by adits, probably the oldest method. Both coal and lead were mined in this way. A vertical shaft was often driven to take out the minerals, the horizontal adit being used to remove water and provide ventilation, assisted by fires in the vertical shafts.

Adjamé. Native and original name of the former capital of the Ivory Coast, French West Africa, now known as Binger-ville (q.v.).

Adjective (Latin *adjectus*, thrown to). Word used in grammar to express the qualities of a noun, or to restrict or enlarge its meaning and application. Nouns are often used as adjectives and adjectives as nouns, and probably they were originally used indifferently. In different languages, the adjective sometimes precedes, sometimes follows its noun.

Adjournment (Lat. *ad*, to; *diurnus*, daily; cf. Fr. *jour*, a day). Literally, a postponement to another day. The word is chiefly used in connexion with debates in Parliament and meetings of other public bodies, where it is opposed to dissolution, which

is the end of a meeting. One of the privileges of the House of Commons is that the member who moves the adjournment of the House has the right of opening the debate when resumed.

Adjudication (Lat. *adjudicare*, to adjudge). A term used in bankruptcy law. The court is said to adjudicate or declare a debtor bankrupt when satisfied that there is reason for so doing. See Bankruptcy.

Adjustment (Lat. *ad*, to; *justus*, exact). Term that is used in marine insurance. It means settling the exact amount of money an insured person shall receive for goods lost at sea. Being often a complicated matter, the work has fallen into the hands of a specially trained class of men called adjusters. These have formed themselves into a society, the Average Adjusters' Association, which makes rules for their guidance. See Insurance.

Adjutant (Lat. *adjutare*, to assist). Term formerly employed in ordinary language, but at present only used in the military sense. In the British army an adjutant is a regimental staff officer who is recommended for appointment by the commanding officer of a garrison, regiment, or battalion, or of a training unit, and assists in all details of duty. The appointment is almost always held by a captain, but occasionally by a senior lieutenant who may be promoted to captain on appointment. The adjutant receives and issues orders on behalf of the commanding officer, directs the training of recruits, superintends the work of the orderly-room and general administration of the unit, and is responsible for the upkeep of the regimental books and records.

The adjutant of an artillery regiment has additional duties, as the batteries are frequently distributed at some distance from headquarters. Regimental officers wishing to communicate with the commanding officer do so through the adjutant. An adjutant is appointed for three, or very occasionally six, years, and receives additional pay. When it is desirable the C.O. may appoint a lieutenant as assistant-adjutant, this officer being responsible for assisting the adjutant in training duties.

In the Royal Air Force there are station and squadron adjutants; the former appointment is normally held by a squadron-leader and the latter by a pilot officer or flying officer. Station and squadron adju-

tants are responsible for the general administration of their units.

In peace time officers of the regular army are appointed as adjutants of all auxiliary forces. In foreign armies an adjutant is frequently the equivalent of a British aide-de-camp, while adjutant-general is the equivalent of an aide-de-camp to a royal personage. In the French army an adjutant (*adjutant*) is the equivalent of a British company-sergeant-major, but ranks such as adjutant-major, etc., are conferred on officers holding various administrative appointments. In the U.S. army an officer, usually a captain, is appointed regimental adjutant by the colonel of the regiment, and battalion adjutants, usually lieutenants, are appointed by the battalion commanders.

Adjutant (*Leptoptilus dubius*).

Indian stork of the genus which includes the marabou stork of Africa. It is a large bird, standing nearly 5 ft. high, and the extended wings often measure 15 ft. from tip to tip. Its bald head and the pouch hanging on its breast give it a somewhat repulsive appearance. It is useful in India by reason of its scavenging habits.



Adjutant, a bird of the stork family

Adjutant-General 10 THE FORCES. One of the military members of the British Army Council. Charged with duties pertaining to the army personnel, he raises recruits and is responsible for medical services, education, welfare, prisoners of war, and the registration of graves. Questions of military discipline are referred to him, and he issues orders when the military is needed to aid the civil power. He regulates the flow of drafts to units abroad, and the discharge of time-expired men. On mobilisation he allots units to formations, settles which battalions are to form the brigades, and appoints reserve officers to units. In war an adjutant-general is appointed to the staff of a commander-in-chief, and deputy adjutant-generals, assistant adjutant-generals, and deputy assistant adjutant-generals (D.A.A.G.) to the staffs of commanders of corps and divisions.

Adler, ALFRED (1870-1937). Austrian psychologist. Born in Vienna, Feb. 7, 1870, he graduated M.D. in Vienna in 1885 and practised there 1897-1927, when he was appointed lecturer in psychology at Columbia University, New York. In 1932 he became professor of medical psychology at Long Island College of Medicine. Rejecting Freud's theory of dreams, and with it the basic principles of psycho-analysis, he was the founder of the school of individual psychology, which looks for the origin of neurosis in physical mal-development, leading to the "inferiority complex" and the "masculine protest." In his system the moving force in human life is not sex or love, as Freud maintained, but the will to power. Adler's most important book was *The Practice and Theory of Individual Psychology* (Eng. trans. 1924), and his work is explained in P. Mairé's *A B C of Adler's Psychology*, 1928. Adler died suddenly at Aberdeen, where he was delivering a course of lectures at the University, on May 27, 1937. See *Psycho-Analysis. Consult* Alfred Adler, P. Bottome, 1939.

Adler, HERMANN (1839-1911). Jewish scholar. Born at Hanover, the son of Nathan Marcus Adler he was educated at London University, and in 1863 became principal of the Jews' College in London. Appointed in 1879 assistant to his father, the chief rabbi in the British Empire, he succeeded to that office in 1891. Possessing a liberal and sympathetic outlook on life, he was prominent in most movements for social betterment. He died July 18, 1911.

Adler, NATHAN MARCUS (1803-90). Jewish scholar. Born at Hanover and educated in Germany, he was in turn chief rabbi of Oldenburg and of Hanover. In 1844 he became chief rabbi in London where he promoted union among the various Jewish congregations, and organized Jewish schools. He published a Hebrew commentary on the Pentateuch. He died Jan. 21, 1890.

Adler, VICTOR (1852-1913). Austrian socialist. Born at Prague of Jewish parentage, he became leader of the Austrian Socialist party, which he largely founded. He sat for many years in the Reichsrath, and was foreign minister at the time of his death. Nov. 11, 1918.

Ad libitum. Latin musical term meaning at pleasure, and usually referring to pace. It is also used generally, abbreviated

as *ad lib.*, in the sense of any amount, or to any extent.

Admetus. In Greek legend, son of Pheres, king of Phrae in Thessaly. He took part in the Calydonian boar-hunt and the voyage of the Argonauts. The devotion of his wife, Alcestis, is the subject of a play by Euripides, freely adapted by Browning in *Balaustion's Adventure*. Apollo having obtained from the Fates the promise that Admetus should never die if somebody else consented to die in his stead, Alcestis volunteered to take his place. In Euripides, she is said to have been restored to her husband by Hercules. In another story, Persephonë allowed her to return to earth.

Administration (Lat. *ad*, to; *ministrare*, to serve). Word used to describe men collectively responsible for the government of a country, or for the work, or a section of it, under their control. Thus we speak of a French administration, of a liberal or conservative administration, of the administration of the poor laws, of justice, or of an estate.

Administration, LETTERS OF. Phrase used in English law. When a person dies without a will; or leaves a will but without an executor named therein; or the executor has died before the testator; or the executor is under age, or a lunatic, or for some other reason cannot act; or the executor declines to act, the proper course is for some person to take out letters of administration in the Probate Division, to enable the deceased's property to be dealt with and his debts paid. Until this is done, no one can legally pay anything owing to the deceased, or in any way meddle with his property.

Letters of administration will be granted to the widow, or next of kin, or if none of these wishes to act, then to a creditor. An administrator has to give a bond, with sureties, for an amount generally double the value of the estate, that he will faithfully administer. In the case of an administrator appointed in place of an executor, i.e. where there is a will but no executor, the letters of administration are said to be *cum testamento annexo*, i.e. with the will annexed.

Administration Action. English legal term for an action brought in the Chancery Division to administer the estate of a deceased person. Such an action may be begun by anyone interested in the estate, whether as a trustee, executor, administrator, legatee, heir, or creditor. Commonly it is called putting the estate into

Chancery. An action of this kind is generally brought by beneficiaries who think the trustees or executors are wasting the assets or have been guilty of misconduct; or by creditors who desire to have the estate wound up with the protection of the court.

When the estate does not exceed £500 in value, the action may be brought in the county court, and estates under £1,000, where the persons entitled to the property are of small means, may be administered by the Public Trustee. Instead of ordering administration the court may order the application to stand over for a time to enable the executors or administrators to produce proper accounts.

When an administration order is made, the executor or administrator must obtain permission from the court before dealing with the assets. The court will order the accounts to be prepared and inquiries made. Where an executor or administrator is shown to owe money to the estate, he may be ordered to pay it into court, under penalty of imprisonment up to one year if he fails.

In general, the costs are in the discretion of the court. Where, however, an executor or administrator or trustee has not been guilty of any misconduct he will be entitled to have his costs paid out of the estate.

Administrator. In English law, the person to whom are granted letters of administration to wind up the estate of a deceased person. The order in which the court will grant such letters is (1) next-of-kin; (2) creditors. The next-of-kin rank in the following order of preference. (1) Widow or widower; (2) child; (3) grandchild; (4) great-grandchild; (5) father; (6) mother; (7) brother or sister or their descendants; (8) grandparent; (9) uncle, aunt or their descendants. In default of these the crown is entitled. If a man makes a will, and either appoints no executor, or the executor dies, the Probate court will appoint an "administrator with the will annexed," to wind up the estate and give effect to the will. In this case the residuary legatee is usually appointed, as being the person most interested. Creditor administrators are generally appointed when the deceased has left more debts than estate. When an illegitimate person dies intestate and unmarried, the mother is entitled to all his property; if she is dead, the crown takes it.

Admirable Crichton, THE. Comedy by J. M. (Sir James) Barrie. Produced Nov. 4, 1902, at the Duke of York's Theatre, London, it had a run of 328 performances. The hero, an earl's butler called Crichton, wrecked with his master and other "society" people on an uninhabited island, establishes himself, owing to his strength of character, as head of the community, even becoming engaged to the earl's eldest daughter.

Admiral (Arab. *amir-al-bahr*, commander of the sea). Title borne by naval officers of high

flag at sea he is retired when his turn comes. Vice-admirals are employed in command of important naval bases, battle squadrons and the larger fleets abroad, and must retire at 65 or on completing three years from their last service.

The rank of admiral, also awarded by selection, is the highest in which naval officers are usually employed, and all the principal commands, both afloat and ashore, are generally held by admirals. The age limit is 65, and retirement is enforced after three years' unemployment, or immediately on

Italian *gran ammiraglio* correspond to the British admiral of the fleet. In the U.S. fleet the highest substantive rank is that of rear-admiral, but officers holding important commands are appointed fleet admirals, admirals or vice-admirals for their periods of office.

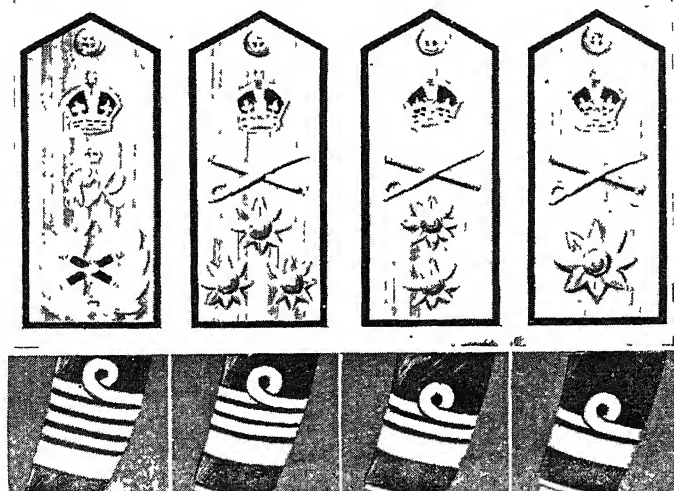
Admiral Graf Spee. German battleship. Launched in 1934, one of the Deutschland class of 10,000-ton "pocket" battleships, she actually displaced 14,000 tons, had a speed of 26 knots, and carried six 11-in. and eight 6-in. guns. At the outbreak of war in 1939 she preyed on Allied and neutral shipping, and was known to have sunk nine ships, a total of 50,089 tons, all but one in the S. Atlantic. In the battle of the Plate (*g.v.*), fought Dec. 13, 1939, the Graf Spee was so damaged that she fled into Montevideo harbour. From here she steamed out on Dec. 17, only to be scuttled by Hitler's orders in the chief anchorage outside the harbour. Her commander, Capt. Langsdorff, committed suicide on Dec. 20.

Admiral Hipper. German cruiser which gave her name to a class of four heavy cruisers. Completed in 1939, she had an alleged displacement of 10,000 tons, carried eight 8-in. and twelve 4.1 guns, and had a complement of 830. In May, 1945, she was found stranded in Kiel harbour.

Admiral Scheer. German "pocket" battleship with the same tonnage, speed, and armament as her sister ship the Admiral Graf Spee (*v.s.*). Notorious as a commerce raider during the opening months of the Second Great War, and damaged by torpedo in April, 1940, she was sunk in Kiel harbour by R.A.F. bombs on April 9, 1945.

Admiralty, BOARD OF. Governing authority of the British Navy. The Lords of the Admiralty constituting the Board are commissioners appointed by letters patent for executing the duties of a lord high admiral. The office was first put into commission in 1628, and in 1690 a declaratory Act confirmed the powers of the lord high admiral in the Admiralty Board. From 1709 onward, except in 1827-8, when the duke of Clarence was lord high admiral, the office has always remained in commission. The Navy Board, the Commissioners for Victualling, and other bodies, subordinate to the Admiralty, conducted the work of shipbuilding, dockyard work, victualling, etc.; but this divided control, which had led to many difficulties, ended in 1832,

2 D 1



Admiral. Insignia of rank on the shoulder straps and the left sleeve cuffs of the four officers of highest rank in the Royal Navy. Left to right: Admiral of the Fleet, Admiral, Vice-Admiral, Rear-Admiral

rank. Its first use occurs in a convention dated March 8, 1297, wherein William de Leybourne is described as Admiral of the Sea of the King of England. Commonly used to indicate any naval officer senior to a commodore, it is properly applied only to those who stand in seniority between vice-admirals and admirals of the fleet.

In the British Navy a captain selected for promotion becomes a rear-admiral, but may be retired at once if he has not completed the necessary qualifying service, or if the Admiralty do not propose to offer him further employment, the latter including, for this rank, the command of naval establishments and small squadrons, and the subordinate command of larger naval forces. Rear-admirals are compulsorily retired on reaching the age of 60, or on completing two and a half years from their last service. Promotion to vice-admiral is by selection, but if a rear-admiral has not hoisted his

promotion if the officer had not served as a vice-admiral. Advancements to the rank of admiral of the fleet are made by the sovereign's selection, subject to qualifications as to service. Officers of this rank are rarely given employment, but are borne on the active list for life.

Admirals when on active service fly a flag indicative of their rank, whence the term flag officer. The admiral of the fleet's flag is a Union flag, and the admiral's a plain S. George's cross, while vice- and rear-admirals have respectively one and two red balls on the canton or cantons next the staff. Until 1864 the flag ranks below admiral of the fleet were subdivided into those of red, white, and blue squadrons, the rank of Nelson at Trafalgar being vice-admiral of the white.

In nearly all foreign navies the system as regards flag rank is similar to that in the British. The German grand-admiral and the

when the duties of the Navy Board and the other commissioners were transferred to the Lords of the Admiralty, who, under orders in council, became heads of the civil departments.

The First Lord, the minister who is now responsible for the navy to the minister of Defence, presides over the Board of Admiralty, and there is a maximum of 16 members. They include the First Sea Lord, who is also chief of naval staff, the deputy First Sea Lord, the Second Sea Lord (chief of naval personnel), the Third Sea Lord (Controller), the Fourth Sea Lord (chief of supplies and

transport), the Fifth Sea Lord (chief of naval air equipment), the vice-chief of naval staff, the assistant chief of naval staff (trade), the assistant chief of naval staff (weapons), the Parliamentary Secretary, the Civil Lord, the Financial Secretary, the Controller of Merchant Shipbuilding and Repairs, and the Permanent Secretary.

Admiralty, COURT OF. English court of law which existed as a separate entity until 1875, and is now represented by the Probate, Divorce, and Admiralty Division of the High Court of Justice. In the reign of Edward III the various

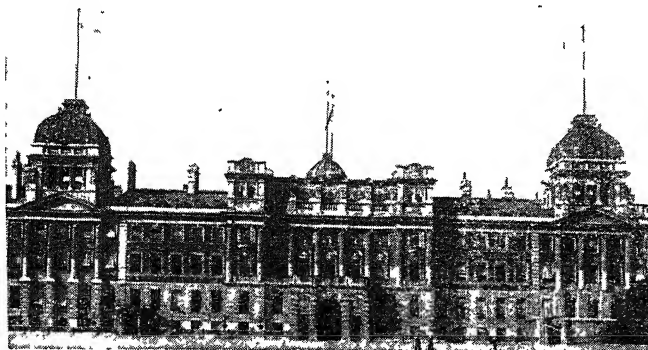
admirals had certain rights of jurisdiction, courts held in their names being presided over by their deputies. Soon after 1400 there was only one admiral, the lord high admiral, for all England, and consequently only one court. Its duties were to punish crimes committed on the high seas, to decide questions about prizes, and, as trade developed, to settle disputes about contracts, ownership, collisions, salvage, and the like.

Several Acts of Parliament, among them one in 1389 and another two years later, laid down the limits to the growing powers of the Admiralty court, which had

encroached on the domain of the courts of common law, but in the time of James I there were again disputes about the extent of its jurisdiction, and throughout the 17th century its importance waned. But the many battles and skirmishes in which British ships were engaged in the 18th and early 19th centuries resulted in a great renewal of jurisdiction by the court in the matter of prizes. During the Napoleonic wars well over 1,000 prize cases were regularly heard in the course of a single year. In 1841 and 1860 Acts extended its powers but only in civil cases, for since 1834 it had been deprived of criminal jurisdiction. Under the Act of 1873, which reorganized the whole judicial system, this court was united with others to form the Probate, Divorce, and Admiralty Division of the High Court. In time of war the president of this division is appointed president of the Prize Court, which administers the law of nations, as the Court of Admiralty did during the Napoleonic wars. Scotland had an Admiralty court until 1831 and Ireland one until 1877. Vice-admirals' courts, local institutions, existed in England until 1835. They were also set up in most of the British colonies, Jamaica having one in 1662, but nearly all of



Admiralty. Board of Admiralty in session in November, 1939. Reading from the left round the table are: Mr. (later Sir) Geoffrey Shakespeare, Rear-Admiral H. M. Burrough, Vice-Admiral Sir Alexander Ramsay, Rear-Admiral T. S. V. Phillips, Admiral of the Fleet Sir Dudley Pound (then First Sea Lord), Sir J. Sidney Barnes, Mr. Winston Churchill (First Lord of the Admiralty from Sept., 1939, to May, 1940), Sir Archibald Carter, Admiral Sir Charles Little, Rear-Admiral B. A. Fraser, Rear-Admiral G. S. Arbuthnot, and Captain A. V. M. Hudson, M.P.



Admiralty Offices, St. James's Park, London. Surmounted by wireless transmitting and receiving aeriels, they occupy the north side of Horse Guards Parade

them were abolished in 1890, their jurisdiction being transferred to other courts.

Admiralty Arch. Triumphal arch in London. It is at the entrance from Trafalgar Square into St. James's Park, and commands a fine view along the Mall with the Victoria Memorial and Buckingham Palace at the other end. Designed by Sir Aston Webb, it is part of the national memorial to Queen Victoria. It is a triple arch,

troops in Sept., 1914, and have formed part of the Australian mandate of New Guinea since 1920. Japanese forces overran the islands early in 1942, but U.S. forces, landing on Los Negros Is. on Feb. 29, 1944, had cleared the whole area by March 18. The native population in 1940 was 13,450.

Admiralty Unit. Practical unit of electrical capacity adopted by the Admiralty. Also called a jar (from Leyden jar). Equals

to which he has been presented by the patron is performed by the bishop of the diocese, and the clerk cannot enter on the cure of souls without it.

Admittance. Term used in English law. On a change of ownership of a copyhold the new tenant had to be admitted by the lord of the manor, who was always, or nearly always, entitled to a fine for the admittance. This used to take place in a court, attended by the tenants of the manor. The Law of Property Act, 1922, abolished copyhold tenure as from Jan. 1, 1926.

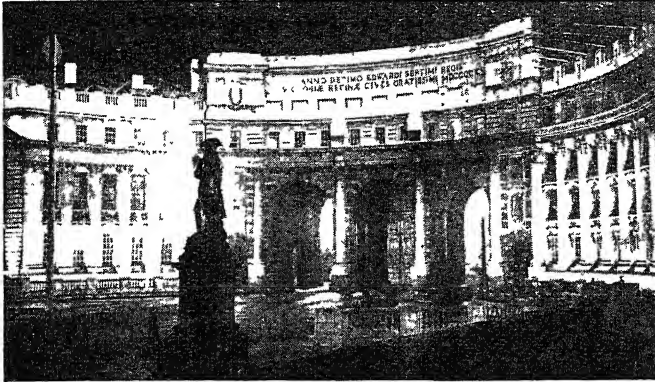
In electricity, admittance is the reciprocal of impedance (*q.v.*), applied particularly to alternating current circuits.

Adobe. Spanish word meaning sun-dried bricks. These bricks are made of mud, chopped straw or similar material being added to prevent cracks in the drying. The word is also used for the earth from which the bricks are formed and any structure made of the material indicated. Slime of this kind of earth serves for mortar.

An adobe structure is formed by embedding dry mud in wet mud. Adobe bricks are found plentifully in prehistoric structures in hot climates. Egypt abounds in them, and in the pre-Aztec remains of Mexico they are sometimes ball-shaped, as if moulded in the palms of the hands. Egyptian mud-bricks of great age were shaped in moulds, and Layard states that their ordinary size was about 12 ins. by 12 ins. by 3½ ins., while some were much larger. Sun-dried bricks attain to great hardness in hot countries, but a serious proposal, made in 1916, that rammed earth (*pisé de terre*) should be used in England for the construction of labourers' cottages ignored the humidity and comparative sunlessness of the British climate. See Brickmaking.

Adolescence (Lat. *adolescere*, to grow up). Term applied generally to the condition or process of growing, and specifically, in human beings, to the period of growth between puberty and the full development of the body. Adolescence extends from about the age of 14 years to 25 in males, and in females from about 12 to 21.

Adonai (Hebrew, My Lord). Term used by the Jews, in reading scripture, wherever the divine name YHVH (Yahveh) or JHVH occurs alone, from fear of guilt under Lev. 24, 16. In the English version of the O.T. Lord is printed in capitals when used to



Admiralty Arch. Floodlit view, from the Mall, of the Arch, erected in 1910. The statue in the foreground is that of Captain Cook

connected by a bridge with the Admiralty offices, hence its name. The Admiralty library is housed in rooms surmounting the arch.

Admiralty Droits. Rights which were at one time the perquisites of the office of the lord high admiral. In 1702 they were surrendered to the Crown, and now form part of the public revenue. All ships, boats, or cargoes, flotsam, jetsam, and lagan, or wrecks and treasure found in the high seas outside territorial waters; all goods and property taken or recaptured from pirates; all royal fishes, such as whales and sturgeons; ships or goods captured from an enemy by a private ship; enemy ships or goods found in British ports or creeks are droits of admiralty. If soldiers from the land capture an enemy ship it is not a prize, but a droit of admiralty.

Admiralty Islands. Group of islands in the Pacific, N. of New Guinea. Part of the Bismarck archipelago, their total area is some 600 sq. m. Manus, the largest, about 55 m. long, is mountainous but fertile. The natives are of Papuan origin. Coconut trees abound, and the pearl fisheries are valuable. Discovered by the Dutch in 1616, and part of a German protectorate in 1885, they were occupied by Australian

one-nine-hundredth of a microfarad. See Capacity; Condenser.

Admission (Lat. *admittere*, to let in). Term used in English law. In civil proceedings it is equivalent to confession in criminal proceedings; i.e. it is a statement made by a party (plaintiff, defendant, pursuer, etc.) to an action or suit, and is always evidence against the party who makes it. All things written by a party are admissions, e.g. entries made by him in books of account: but a verbal admission can be testified to by anyone who heard it made.

An admission may be made by gesture or conduct as well as by words; and an admission made by an agent, while acting in the matter for which he is employed, is evidence against his principal. But an admission made by an agent after his employment has ceased cannot be used against the principal. An admission is generally conclusive against the person who made it, unless he shows that he spoke or wrote under a misapprehension. As a general rule, admissions by a wife are not evidence against a husband, but they will be evidence if she made them while acting as his agent.

In the Church of England the admission of a clerk to the living

represent YHVH, the pronunciation of which is incorrectly represented by the word Jehovah. The Greek and Latin equivalents for YHVH are Kyrios and Dominus.

Adonais. Elegiac poem written by Shelley in 1821. It was occasioned by the death of John Keats, the poet, whose untimely end is likened to that of Adonis.

Adoni. Town of India, in Madras province. It is 64 m by rly. N.E. of Bellary, and manufactures carpets, silk, and cotton goods. Pop. 30,232.

Adonijah. David's fourth son (2 Sam. 3). Born when his father reigned over Judah only, he claimed to be heir-apparent, being supported by Abiathar and Joab, and using similar means to those adopted by Absalom. David, then nearing his end, caused Solomon, who was born when David was king of all Israel, to be anointed and enthroned. Adonijah was pardoned, but, falling under suspicion of reviving his claim, was put to death by command of Solomon (1 Kings 1-2).

Adonis. In Greek mythology, a beautiful youth beloved by Aphrodite. When he was killed by a wild boar, Aphrodite's grief was so great that Zeus allowed him to spend alternately six months among the living and six among the dead. The worship of Adonis, of Phoenician origin and widespread in Mediterranean countries, was in essence the worship of a spirit of vegetation, or more particularly a corn-spirit, the periods of six months referring to the growth of nature in spring and its decay in winter. The gardens of Adonis, which formed part of the festival in his honour, were collections of plants in flower which soon withered. *Consult* Adonis, Attis, Osiris, J. G. Frazer, 1906.

Adoption (Lat. *ad*, to; *optare*, to select). Legalized transfer of the parental rights and duties in respect of a child to some person other than the child's parent or guardian. Until the Adoption of Children Act, 1926, and in Scotland the Adoption of Children (Scotland) Act, 1930, no such transfer was possible in the United Kingdom. These Acts enable such a transfer to take place on an adoption order being made by a Court, and references here to "adoption" are to adoption by such an order. It was, and to a limited extent still is, possible for a person to take a child permanently into his custody, the parents consenting, without any adoption order. But in such cases the father

(or, if the child is illegitimate, the mother) may later reclaim it unless this would be injurious to the child.

Before an adoption order can be made, the parents or guardians of the child must consent, unless their consent is dispensed with by the Court. Any unmarried person under 21 may be adopted. Husband and wife may jointly adopt a child. Unless the adopter is the child's mother, the adopter must be at least 25 years old. The adopter must also be at least 21 years older than the child, except when the adopter and child are within the prohibited degrees of consanguinity or the application is made by husband and wife jointly and the wife is the mother, or the husband is the father, of the child. A male person cannot, except in special circumstances, be the sole adopter of a female.

After a child is adopted, an entry in accordance with the adoption order is made in the adopted children register kept by the registrar-general of births, deaths, and marriages; and a certified copy of this entry may thereafter be used to prove the child's age instead of the usual birth certificate.

This adoption certificate shows that the child is not the natural child of the adopters but does not reveal who its natural parents are. Although full records are kept at the registry they can be inspected only with permission from the Court.

Prevention of Abuses

Provisions have been made to prevent abuses in arranging adoptions and to protect children. All "bodies of persons" (except a local authority) arranging adoptions must be registered as an adoption society with the county or county borough council. When an adoption is arranged by an adoption society, there is a probationary period of three months. During this period the intending adopter may give up the child or the society may remove it. After that time the intending adopter must apply for an adoption order within a further three months or give up the child.

When the intending adopter and the child are brought into touch with one another through some private individual (e.g. a doctor or minister) who is not the parent or guardian or a relation of the child, notice must be given to the local welfare authority seven days before the intending adopter takes possession of the child. This does not apply where the child is

nine years old or more. Child protection visitors may visit the child until it reaches the age of nine or until an adoption order is obtained.

With some minor exceptions, no one except a local authority may receive any payment in connexion with arranging an adoption. It is illegal for anyone to advertise that he or she wishes to have a child adopted or to adopt a child, and only a registered adoption society or a local authority may advertise that they are prepared to arrange adoptions.

The adoption order transfers to the adopter all rights and duties relating to the custody, maintenance, and education of the child. Rights of property are, however, not affected, so that neither adopter nor child acquires any right to succeed to property should the other die intestate. In 1949 a private member's bill was introduced into parliament and welcomed by the government; amendments to the bill included a provision that adopted children should have rights to succeed their adopting parents on intestacy, and a proposal to bring adopted children within the rules of consanguinity. In 1948, 20,000 adoption orders were made.

Adoption was a legal and common practice in ancient Greece and Rome. In Greece a man could adopt a son posthumously by provision in his will.

Adoptionism OR ADOPTIANISM. Heresy that Jesus Christ as man was the Son of God by adoption only. Known in the 2nd century, it was formalised in Spain in the 8th by Archbishop Elipand of Toledo and Bishop Felix of Urgel, who were opposed by Alcuin. It was condemned by the councils of Narbonne, 788, Ratisbon, 792, Frankfurt, 794, Friuli, 796, and Aix-la-Chapelle, 799.

Adoptive Acts. Acts of Parliament which local authorities may or may not adopt at their pleasure. Acts empowering local authorities to establish free libraries, museums, and baths, for example, are usually adoptive, as are some concerning public health; but the present tendency is to make the latter class compulsory. *See* Local Government.

Adoration (Lat. *adorare*, to worship). In a general sense, any act of worship. Roman Catholic theologians recognize three acts of adoration or cultus: latia, the worship due to God alone; hy-perdulia, veneration of the Blessed

Virgin Mary; and dulia, homage to the angels and saints. In art, adoration may mean a representation of the visit of the Magi to the Infant Christ, or a symbolic picture of worship of God in heaven.

Adour. River of France. The ancient Atur, it rises in the Pyrenees and flows over 200 m. N. and W. through Hautes-Pyrénées, Gers, and Landes to the Bay of Biscay below Bayonne. It is navigable for about 80 m., and is in parts canalised.

Adowa OR **ADOA.** Town of Abyssinia. Capital of the prov. of Tigré, it stands 6,270 ft. above sea level, and is the chief centre of trade between the interior of Tigré and the coast. Scene of an Italian military reverse in 1896, the town was captured by the Italians on Oct. 6, 1935, during their conquest of Abyssinia, but was liberated by British forces April 5, 1941. Pop. about 5,000. See Abyssinia; E. Africa Campaign.

Adowa, BATTLE OF. Fought March 1, 1896, between the Italians and the Abyssinians. Anxious to enlarge their African territories, the Italians made a treaty with Menelek, Prince of Shoa, providing him with arms in return for certain concessions. The parties quarrelled. After a success at Coatit, in 1895, an Italian army entered Abyssinia and met with two reverses. Their general, Baratieri, then concentrated his army of about 25,000 men, including 15,000 natives, in a fortified camp in the hills. Hard by were encamped 120,000 Abyssinians, most of them armed with French rifles. Baratieri was prepared to wait in the hope that hunger would compel his foe to move, but being urged to act by the Italian premier Crispi he continued operations.

Dividing his striking force into four brigades, each about 4,000 strong, Baratieri arranged for a night march through the hills. Maps and guides were untrustworthy, spies numerous, and the Italian plans failed. One brigade, the left, took a wrong direction, was attacked by overwhelming numbers and almost annihilated, while another, the right, sent to its succour, after a stubborn engagement was destroyed. The two remaining brigades, with a victorious enemy around them, suffering from thirst and weariness, were ordered to retire. The Italian losses were over 6,000 killed and about 4,000 taken prisoner. The Abyssinians lost between 15,000 and 16,000.

Adramyti OR **EDREMID.** Seaport of Asia Minor in the Turkish vilayet of Balikesir. It stands at the head of the gulf of the same name opposite Mitylene, and 80 m. N. of Ismir. The ancient Adramyttum was close by. Olive trees abound in the vicinity. The Gulf of Adramyti is an arm of the Aegean Sea.

Adrar (Berber, highlands). Name of several large areas in the French and Spanish Sahara. The most important are Adrar Ahnet, Adrar Iforas, Adrar Suttuf, and Adrar Temur. Adrar Ahnet is a district of French Sahara, an elevated region lying S.S.W. of the Hoggar or Ahaggar mountains and bounded on the E. by Ar (Asben) and on the W. by Adrar Iforas. It is extremely barren, and the nomad population consists of Tuaregs.

Adrar Iforas, another district of French Sahara, forms part of a desert plateau lying W. of Ar (Asben) and N.E. of Timbuktu. It is mountainous and practically waterless; the population is mostly nomadic, but there are settlements at Tessalit and Teleyet. From 1903 it was extensively explored by the French government with a view to the construction of a Trans-Saharan railway from Algiers to Timbuktu.

Adrar Suttuf is a region of Rio de Oro, Spanish Africa, in the S.W. of the colony, immediately S. of the Tropic of Capricorn. A mountainous district, yielding salt deposits, it was confirmed in Spanish possession by a boundary treaty with France in 1900. The area is about 2,200 sq. m.

Adrar Temur is an administrative district of Mauretania, French Sahara. Lying to the N.E. of the Senegal river, it is mountainous and arid but with numerous oases. The principal centres of population are Atar, where date palms are found, and Shingeti, where caravans start for St. Louis in Senegal with dates, ostrich feathers, and gold dust. Salt is mined in the Ijl district adjoining Rio de Oro. Other places are Wadan and Ujeft. The mixed population of Berbers, Arabs, Tuaregs, and Negroes is estimated at 10,000. See Rio de Oro; Sahara.

Adrastus. In Greek legend, king of Argos and Sicyon. With six other chiefs, he organized the expedition of the Seven against Thebes to restore the fugitives Tydeus and Polyneices, in which all the leaders perished except himself. Ten years later he led the sons of the fallen heroes, known as Epigoni or descendants,

in a second war, in which Thebes was taken and destroyed.

Adrenalin (Lat. *renes*, the kidneys). Active principle of the supra-renal gland, a small organ attached to the kidneys. It was discovered in 1901, and is a very powerful astringent. It maintains the muscular tone of the arteries and its lack produces Addison's disease (*q.v.*). Injected into the tissues, it causes the smaller blood vessels to contract and so arrests bleeding and reduces local congestion: it is, therefore, effective in hay fever, asthma, and oedema of the larynx. Adrenalin is used in local anaesthetics. During physical effort or excitement adrenalin releases sugar from the liver into the blood, thereby increasing bodily energy. See Endocrine.

Adria. Episc. town of Italy, in Rovigo prov. On the Bianco canal, between the Po and Adige rivers, 26 m. S.W. of Venice, it is built on the site of the once important Etruscan port of Hatria, whence the Adriatic, now some 13½ m. distant, derived its name. Pop. 11,878.

Adrian. Christian name derived probably from the town of Hatria, or Hadria, the modern Adria, in northern Italy. It was borne by six popes, two of whom (III and V) were unimportant. The Roman emperor of this name is usually known as Hadrian (*q.v.*).

Adrian. Roman saint, martyr, and soldier. Converted by witnessing the heroism of some Christian martyrs, Adrian was put to death at Nicomedia, March 4, 303. He is regarded as the patron saint of the soldier, and numerous churches in Flanders are named after him. His festival is kept on Sept. 8. According to legend Adrian's limbs were cut off on an anvil, an emblem which appears on representations of his figure.

Adrian I. Pope 772-95. A Roman by birth, he is chiefly known through his association with Charlemagne. When the king of the Lombards, Desiderius, attacked his possessions, Adrian successfully invoked the aid of the Frankish king, and Desiderius was driven out. Adrian I restored some of the Roman aqueducts.

Adrian II. Pope 867-72. By birth a Roman, he succeeded Nicholas I. He was concerned in the affairs of the Frankish empire, then in a state of decay, but had little authority, and the emperor Louis II was his master.

Adrian IV. Pope 1154-9. Nicholas Breakspear by name, he was the only English pope, being

born at Langley in Hertfordshire. He became a monk in France, and, made abbot of a house near Arles, attracted the attention of Eugenius III, who made him a cardinal. He did good work for the Church in Norway and Sweden, and in 1154 was elected pope. He condemned Arnold of Brescia, and exalted the power of the Papacy. By crowning Frederick I as emperor in 1155, he so displeased the Romans that they drove the two rulers from their city. Returning in 1156, Adrian was involved in a quarrel with Frederick about their respective rights, which occupied him until his death at Anagni, Sept. 1, 1159. Adrian was the pope from whom Henry II asked permission to conquer Ireland.

Adrian VI. Pope 1522-23. Born at Utrecht and known as Adrian of Utrecht or Adrian Dedel, he won repute as a professor at Louvain, and in 1507 was appointed tutor to Charles, afterwards Charles V. For about six years he supervised the working of the Inquisition in Spain, and Leo X made him cardinal in 1517. Chosen pope Jan. 9, 1522, he died Sept. 14, 1523. A man of estimable character, he admitted the necessity of church reform though he declared against Luther. He sought to unite all Christian princes in a league against the advancing Turks, but was forced to join an alliance against France. He was unpopular in Italy because he opposed the Renaissance.

Adrian, EDGAR DOUGLAS (b. 1889). English physiologist. Born Nov. 30, 1889, he was educated at Westminster and Trinity College, Cambridge. In 1925 he was made Oliver-Sharpes lecturer to the Royal College of Surgeons, and his work on the nervous system gained him the

Nobel prize (Medicine), 1932. Adrian was appointed professor of Physiology, Cambridge University, 1937. He was elected F.R.S., 1923, and received the Royal medal, 1934. He was awarded the O.M., 1942.

Adrian de Castello (c. 1460-1521). Italian ecclesiastic. Born at Corneto, he went to England on a mission in the reign of Henry VII, who made him successively bishop of Hereford and of Bath and Wells. He became the confidant of Pope Alexander VI, and was created a cardinal in 1503. For complicity in a plot against Leo X he was deprived of his dignities, fled from Rome, and is believed to have been murdered. He left philosophical and other writings.

Adrianople (Gr. *Adrianopolis*, the city of Hadrian). City of Turkey in Europe. Called Edirne by the Turks, it is on the Maritza at its junction with the Tunja, 137 m. by rly. W.N.W. of Istanbul, and is the capital of the vilayet of Adrianople. In addition to the 16th century mosque of Selim II, a ruined palace, and a Byzantine bridge, it has an immense bazaar, barracks, hospitals, schools, and municipal and military buildings. A commercial centre, exporting silk, wine, tobacco, opium, otto of roses, rosewater, wax, Turkey-red dye, and agricultural produce, it manufactures leather, cotton, woollens, and tapestry. Pop. 46,447.

Originally called Uskudama, and renamed after the Roman emperor Hadrian, who rebuilt and embellished it about A.D. 125, from 1361 to 1453 it was the capital of the Ottoman Empire. Here, after the Russo-Turkish War, was signed the treaty of Sept. 14, 1829. Adrianople was entered by the Russians in 1877-78. and

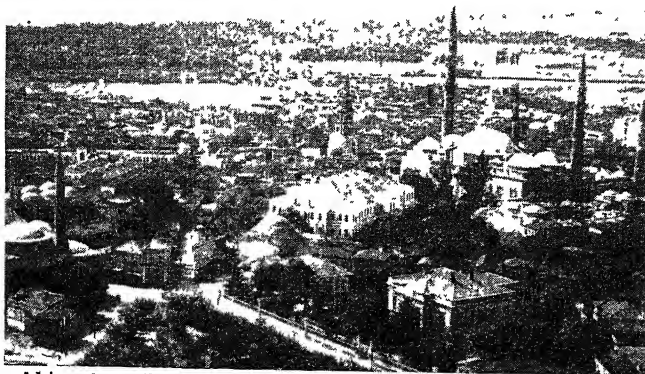
besieged during the Balkan War of 1912-13. It was ceded to the Balkan allies by the Treaty of London of May 30, 1913, but on the outbreak of hostilities between Bulgaria and her former allies was again occupied by the Turks, to whom it was formally restored, with that portion of the vilayet lying E. of the Maritza river, by the Treaty of Constantinople in Sept., 1913.

Adrianople, THE BATTLE OF. Fought Aug. 9, A.D. 378, near the town of that name, between the Romans and the Goths. The Romans were defeated, and Valens, the eastern emperor, was never seen again. This battle, which led to a settlement of Goths within the frontiers of the Roman empire, was the beginning of that empire's downfall. The success of the Gothic cavalry against the Roman infantry established the superiority of the mounted man in European fighting for a thousand years.

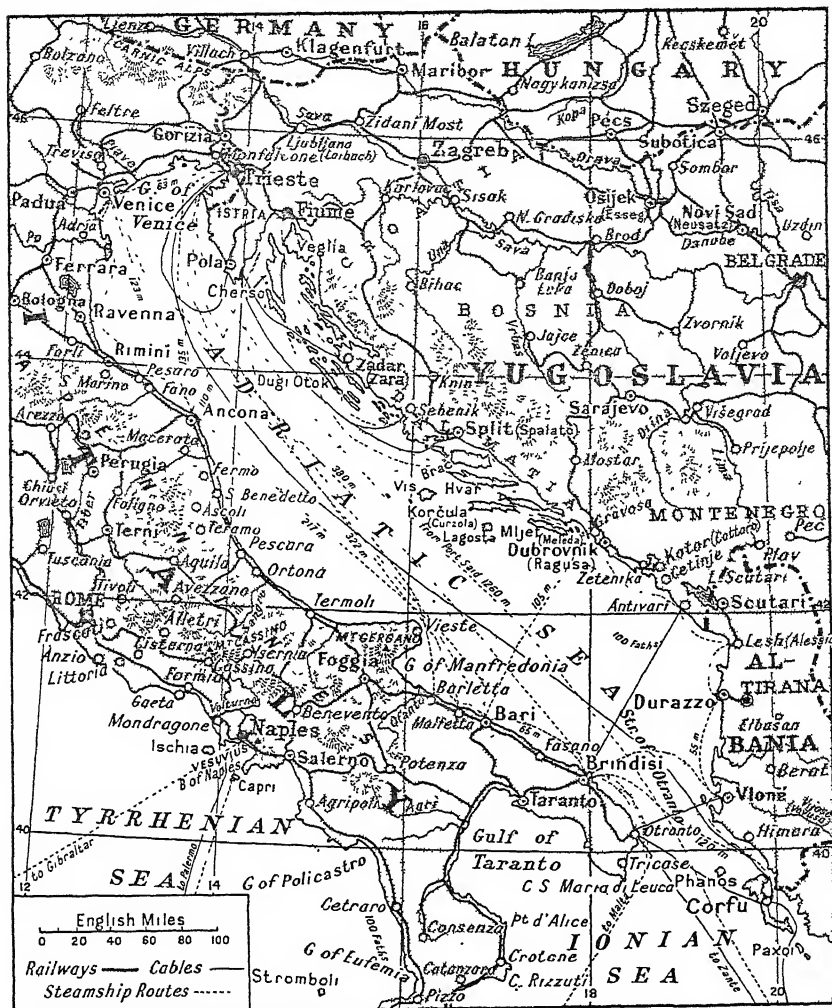
Adrianople, CAPTURE OF. Serbo-Bulgarian success over Turkey, March, 1913. Advancing on Adrianople early in the first Balkan war, the Bulgarians encircled the Turkish garrison there, but were unable to progress farther before the armistice of Dec., 1912. When hostilities reopened in Feb., 1913, Bulgars and Serbs, 100,000 strong, launched an attack on March 24, and the fortress fell on March 26, 39,000 Turkish officers and men and 600 guns being captured. See Balkan Wars.

Adriatic Sea. Arm of the Mediterranean, the ancient *Mare Adriaticum*. Extending N.W. between Italy and the Balkan Peninsula, its length is 470 m., mean breadth 110 m., and area, including islands, about 52,000 sq. m. The W. shore is comparatively low, with few inlets; the E. is steep, rocky, barren, broken, and fringed with islands. Its fisheries give occupation to the seafaring population of the western coasts and islands and from them were recruited sailors for both the Venetian and the Austrian navies.

In the N. the Adriatic has a maximum depth of 25 fathoms. Between Braccia and Ortona it sinks to 100 fathoms, between Monte Gargano and Durazzo it averages 600 and touches 850 fathoms; the mean depth is about 130 fathoms. Its waters are very salt, partly because few large rivers flow into it. Tides are feeble, at Venice rising at most to only 2 ft. A current runs up the E. side and down the W. In



Adrianople, or Edirne. Panoramic view of a flourishing city in European Turkey, the history of which goes back about 2,000 years



Adriatic Sea, which Italian policy between the two Great Wars aimed at converting into an Italian lake by the strategic domination of both shores

colour the Adriatic is greener and darker than the Mediterranean. Its navigation by steamer is easy, but sailors find it dangerous in winter because of sudden gales. It abounds in fish, and sponges are found. Chief ports: Venice, Ancona, Bari, and Brindisi on the W.; Trieste, Pola, Fiume, Zadar, Split, Dubrovnik, Kotor, Durazzo, and Vlone (Valona) on the E.

During the First Great War naval forces of Italy and Austria-Hungary were continuously engaged in the Adriatic, and for a time both sides suffered considerable losses, with the advantage to the Austrians of possessing excellent harbours on the Dalmatian coast. But Italy, assisted by her allies, gradually gained effective control, and in raids on the har-

bours of Trieste and Pola sank or damaged powerful Austrian units. A barrage of submarine nets and mines was maintained across the strait of Otranto, and guarded by British ships.

The Italian landing at Durazzo on April 7, 1939, and the subsequent annexation of Albania, marked a further stage in the attempted fulfilment of Italy's aim of securing the Adriatic as an Italian lake. The Adriatic again became an important area during the Italian campaign against Greece, 1940-41, when Italian supplies were maintained from Bari and Brindisi to Durazzo and Vlone. British warships made a sweep of the Adriatic as far N. as Bari and Durazzo on Dec. 18, 1941. On the capitulation of

Italy in Sept., 1943, and the surrender of her fleet, her Adriatic seaboard was gradually occupied by Allied forces, which captured Rimini Sept. 21, 1944, and entered Trieste May 2, 1945. A British military mission, which reached Albania in April, 1943, began to train an army of Albanian patriots, eventually 20,000 strong, to wage guerilla war against German occupying forces. A British commando force, called Land Forces Adriatic, came into existence in July, 1944, and, in co-operation with the R.A.F. and the R.N., landed in Yugoslavia in Aug. and in Albania in Sept. to assist the guerillas in both countries. The Germans had withdrawn from the Albanian and Yugoslav coasts by the end of the year. For fighting on the Adriatic sector of the Italian front, see Italy: Campaign in. See also Trieste.

Adshead, STANLEY DAVENPORT (1868-1946). British architect. Born in Manchester, he devoted special attention to town-planning, and was professor of town-planning at Liverpool University, 1909-14, and at London University, 1914-35. His works include Ramsgate and Worthing pavilions, and the rebuilding of the duchy of Cornwall estate, Kennington, 1913-14. He wrote *Town-Planning and Town Development*, 1923; *A New England*, 1942. Adshead died April 11, 1946.

Adsorption (Lat. *ad*, to; *sorbere*, to suck up). Term meaning absorption at the surface of a solid body. In a crystal of common salt, NaCl, there is, except at the surface, a regular arrangement of the atoms of chlorine and sodium; each

chlorine atom is attracted by, or combined with, six chlorine atoms; at the surface, however, each chlorine atom is attracted by five sodium atoms and each sodium atom by five chlorine atoms. There is accordingly a reserve of attraction possessed by every atom on the surface which makes the surface more active chemically than the interior. A similar state of things is found in many solids and liquids. A surface of the metal palladium attracts, and is possibly in a state of weak combination with, the gas hydrogen; one volume of palladium in a fine state of division adsorbs about 500 volumes of hydrogen. Charcoal, which is mainly carbon, contains many tiny holes and passages and therefore has a very large number of surfaces. Coconut charcoal and charcoal specially prepared to have plenty of such surfaces are known as activated charcoal. They are largely used to adsorb, or collect, gases, vapours, and liquids that are undesirable or commercially valuable. Special charcoals are used in gas masks, for the recovery of benzene and other volatile oily compounds from town's gas, or to remove fusel oil from whisky. Adsorption plays an important part in dyeing certain fibres and fabrics. Not only are the original surface atoms specially active; the adsorbed atoms and molecules may also be very active. This is the basis of many catalytic action processes used in industry. *See* Absorption; Catalysis.

Adular. Natural potassium aluminium silicate. A variety of potash-felspar or orthoclase, it is usually transparent, but a translucent variety is used as a gemstone under the name of moonstone. The name is taken from Mt. Adula in Switzerland. *See* Orthoclase.

Adullamites. Name given in derision to those members of the Liberal Party, forty or so in number, who, in 1886, left their colleagues rather than agree to Earl Russell's proposals for parliamentary reform. The most prominent of these was Robert Lowe, afterwards Viscount Sherbrooke, and their defection led to the resignation of Russell's ministry. The name was due to John Bright, who likened the dissentients to the distressed, the debtors, and the discontented, who flocked to David in the cave of Adullam (1 Sam. 22).

Adult (Lat. *adultus*, grown up). In English law, a person 21 years old or over. Under that age a person is an infant or minor, and

is subject to legal disabilities. An infant becomes an adult the day before the 21st birthday.

Adult School. Institution for social, educational, and religious work, originally organized and supported by the Society of Friends. These schools exist throughout the United Kingdom, and recent statistics showed a total of about 1,000 schools and nearly 20,000 members. The movement has extended to Australia, New Zealand, Canada, and the U.S.A.

Many schools meet on Sunday mornings. In the 19th century illiterate members were taught reading and writing. This teaching was followed by a meeting, with prayer and singing, and an address. The school then divided into sections for the study of the Bible. The basis of the school is the practical teaching of Jesus Christ. The aim is to help the members to discover and practise the art of living. Broad cultural subjects of a varied nature are now studied, with the aid of an annual lesson handbook. Associated with the schools are libraries, savings banks, study circles, lectures, and social evenings, technical classes, social clubs, sick benefit, coal, book, and athletic clubs. Members are of both sexes, generally over 17 or 18 years of age, and each school is governed by the members themselves. The schools are united in the council of the National Adult School Union, with headquarters at 30, Bloomsbury St., London, W.C.1.

Adulteration (Lat. *adulterare*, to corrupt). Term meaning the debasement of anything by the substitution for one or more of its ingredients of something inferior. It is usually applied to food and drugs.

Pliny in the first century A.D. mentions frauds by bakers who added a soft white earth to bread; in ancient Athens adulteration of wine led to the appointment of an official to stop the practice. Dr. Wynter Blyth has collected instances of severe punishments inflicted during the Middle Ages upon fraudulent vendors of foods. Bakers, brewers, vintners, and "pepperers" were frequent offenders, and were punished by being set in the stocks, whipped, branded, or turned out of the town. A wine-seller condemned to drink six quarts of his own wine died from the effects.

Although adulteration of food is fairly widespread in Great Britain, the devices of dishonest

traders are becoming increasingly difficult to practise undetected.

The report of the Ministry of Health for 1937-38 showed that of 144,675 samples of food examined in England and Wales in 1937, 8,061 were adulterated or not up to the legal standard. Milk is a food easily adulterated by the addition of water, or by adding to pure milk the separated milk remaining after the cream has been removed, by adding condensed milk, gelatin, starch, preservatives, and colouring matter. The extent of milk adulteration varies widely, figures from 2.5 per cent to 35 per cent having been reported. Penalties for this type of offence range from a caution to substantial fines.

Adulteration of food and drugs takes many forms, e.g. coffee containing chicory; gelatin with excess of arsenic; margarine with too much preservative; self-raising flour yielding insufficient carbon dioxide; chemical food short of iron; olive oil containing cheaper oils; senna pods containing grit; too much sulphur in sulphur ointment. During recent years the vigilance exercised over foodstuffs has made the more impudent types of fraud by gross adulteration much more difficult.

Adulteration was the subject of incidental legislation during the reigns of Henry VIII, Mary, Anne, the four Georges, and William IV, and in more recent times gave rise to the series of statutes known as the Sale of Food and Drugs Acts, 1875 to 1927, finally merged into the Adulteration Act, 1928. The law relating to adulteration has since been consolidated into one comprehensive code. This embodies all the public health statutes dealing with the importation, preparation, storage, sale, and delivery of food, the examination and seizure of unsound food, the notification of food poisoning, and the control of markets, slaughter-houses, and cold-air stores. This Act is called the Food and Drugs Act of 1938. During the Second Great War, however, the sale of food was rigorously controlled by regulations and orders, enforcement being carried out by the Ministry of Food. On the other hand, some of the laws affecting foods were relaxed, e.g. some preservatives forbidden before the war were permitted. The shortage of supplies of some articles in common use produced during the war an increasing number of exaggerated and unjustified claims

for certain food substitutes, and the provisions of the law designed for the protection of consumers against false and misleading advertisements and labels for food were strengthened. The Food and Drugs Act prohibits the addition of any substance to any food so as to render it injurious to health or the addition to any drug of any substance that affects the quality or potency injuriously; no article so mixed may be sold. The Act forbids the sale to the prejudice of the purchaser of any food or drug which is not of the nature, substance, or quality demanded. A purchaser cannot be prejudiced, however, if clear notice is given at the time of sale that the article sold is not of the nature, substance, or quality demanded.

The Act also provides for the appointment of public analysts. Authorised officers who purchase samples for analysis are called "sampling officers." The sampling officer, after purchasing a sample for analysis, must inform the seller of his intention to have it analysed, and must then and there divide the sample into three parts, each of which is then marked, sealed, or fastened up, one part being delivered to the seller, one being taken for analysis, and one being retained for future comparison and production in court if necessary. It is characteristic of the wiles of dishonest traders that in order to defeat these measures they will sell only genuine articles to a stranger, lest he be a sampling officer, and will continue to do so until they are satisfied that he is an ordinary regular customer, when they will supply adulterated articles time after time. Any person refusing to sell to a sampling officer renders himself liable to a fine of £5.

A. Shephard

Bibliography. Foods, their Composition and Analysis, Wynter Blyth, 7th ed., 1927; Bell's Sale of Food and Drugs, 11th ed., 1943; Ministry of Health Annual Reports.

Adultery (Lat. *ad*, to; *alter*, other). Unfaithfulness to the marriage vow, or sexual connexion by a husband or wife with someone other than the lawful spouse. Legally, adultery is committed where these conditions obtain, however innocent the adulterer may be morally—e.g. where a woman erroneously believes her husband to be dead. It is not a crime; but it is an ecclesiastical offence, and for that reason a clergyman can bring an action of slander for

being spoken of as having committed adultery, but no other man can. By the Slander of Women Act, 1891, a woman can sue for verbal allegations against her chastity. In English law, adultery by either husband or wife constitutes ground for divorce, though adultery by a husband was made so only as late as 1923. See Divorce.

Adur. River of Sussex, England. About 20 m. in length and navigable for sailing barges, it enters the English Channel at Shoreham. It is a recognizable river at West Grinstead, where are ruins of the Saxon Knepp Castle, and it passes Bramber, which has remains of a Norman castle and church.

Ad valorem (Lat. according to value). Phrase used in the U.S.A. in connexion with duties on the value of imported goods, and in the United Kingdom with those on stocks and shares. See Tariff and Stamp Duties.

Advanced Air Striking Force. Detached elements of the Royal Air Force operating in France in the opening phase of the Second Great War, under the command of Air Marshal Sir Patrick Playfair. Based near Reims, it was equipped with Hawker Hurricane fighters, Fairey Battle and Bristol Blenheim bombers, and Westland Lysander army cooperation monoplane. Photographic reconnaissance work included photographs of the entire Siegfried line. Pilots of this force took part in the earliest combats between Hurricane and Messerschmitt 109 fighters.

Advancement. In English law, the gift by a parent or person *in loco parentis* for the purpose of advancing a child in life. For example, money given to a son to buy a partnership, and also money or property settled on a daughter on marriage, are advancements. Money spent on education, or a mere present on a festive occasion, is not.

Advancement of Learning, THE. Philosophical work by Francis Bacon, first published in 1605. Its object was to survey the whole field of human knowledge, and note such "omissions and deficiencies" as should be made good by learned men. Bacon divided human learning into history, poetry, and philosophy, corresponding to memory, imagination, and reason, as the principal faculties of the mind, and then subdivided these parts. He advocated the use of induction as a means of increasing scientific knowledge. In 1623 the work was

issued in a Latin translation, with considerable additions, as *De Augmentis Scientiarum*.

Advent (Lat. *adventus*, coming). In the eccles. year of the western churches, the four weeks immediately preceding Christmas, reckoned from the Sunday nearest to S. Andrew's Day. Beginning the church year, this season is observed as one of solemn preparation for Christmas and for the second Advent or Parousia (Matt. 24-5). According to one hypothesis, this second Advent is past and judgement is proceeding. The early Church kept a 40 days' fast before Christmas. The words *O Sapientia* in the calendar (Dec. 16) open a Latin anthem still sung in R.C. churches during Advent.

Adventists. Name of several sects, mainly of American origin. The Second Adventists, founded in 1831 by William Miller (1781-1849), believe in the imminence of the second Advent, and have repeatedly assigned dates for it. Seventh Day Adventists date from 1844, believe the second Advent imminent, but do not date the event, and observe the seventh day of the week as the Bible Sabbath. They emphasise temperance and promulgate rules of health.

Adventurers. In general, men who go forth in search of something vague or unknown. In English history the term is applied to those who, in the time of Elizabeth, went out to seek wealth in Muscovy, Cathay, or the Indies by plundering the Spaniards, or in other ways; to those who bought and settled on the land in Ireland confiscated after the rebellion of 1641; and to those who, in the 17th and 18th centuries, drained the fenlands of East Anglia.

Adverb (Lat. *ad*, to; *verbum*, word, verb). Indeclinable part of speech added to verbs, adjectives, and other adverbs to define their meaning more closely. Adverbs are divided into those of place (here, there), time (now, then), quantity (more, less), manner (well, ill), and others. They were originally cases of nouns.

Advertisement Duty. Tax on advertisements in force in the United Kingdom from 1712-1853. It was a stamp duty charged on all advertisements in newspapers at the rate of 3s. 6d. for each paragraph. In 1833 it was 1s. 6d. in Great Britain and 1s. in Ireland, and in 1853 it was abolished. In 1830 it produced £170,000, of which The Times paid £70,000.

ADVERTISING: ITS METHODS AND PURPOSE

C. HAROLD VERNON, President, 1945-46, Incorporated Institute of Practitioners in Advertising

This article describes how a highly developed and essentially modern art, which seeks to combine information with persuasion, maintains its position as a force in the social and economic life of the community. See also the articles on Newspaper; Poster; Printing; Trade Marks, etc.

The word "advertising" is derived from the 14th century English *averte*, meaning "to turn towards" or "to draw attention to," and the "d" was inserted to distinguish it from the Latin *avertere*, meaning "to turn away."

Although advertising in Great Britain dates in an elementary form from the 17th century, its development as a specialised technique of persuasion is of relatively modern origin. The first advertisements were merely announcements, usually relating to books and pamphlets which were about to be published, theatrical productions, sermons; and for more than a century little change occurred in their form of appeal.

In the second half of the 18th century the wood-engravers began to develop a form of decorative advertisement as trade cards. Many of these were very beautiful pieces of work. Hogarth was responsible for a number of them. From this time onwards advertising began to receive recognition as an essential business force, and consequently, as competition became keener, advertising became more ingenious and enterprising. The industrial revolution of the 19th century created a bigger demand and a much wider distribution of goods and manufactures.

Merchants and manufacturers began to "brand" their products to distinguish them from those of their competitors. It was necessary to make the public familiar with these brands, and the result was a considerable increase in the employment of press advertising and other forms of publicity. Progress was, however, slow and the majority of advertisements remained crude and elementary. Their creators displayed no great taste, imagination, or artistic ability, and no great respect for the truth. Often the advertiser relied solely on the mere repetition of his name and gave no reasons why his commodity was better than another.

It was not until the early years of the present century that advertising came to be regarded as a business requiring intelligence, perception, and artistic ability. But before that period a few men of foresight had already begun to devote their attention to the subject. As competition became more intense, advertisers had ventured outside their own office staffs to find new talent. There is the outstanding example of Pears' Soap, whose manufacturers purchased Sir John Millais' Royal Academy picture-of-the-year, "Bubbles," to illustrate a poster. Advertising gradually became "respectable." It was soon found that to be successful it must conform to certain fixed principles: it must be informative, it must make an appeal to one or more of the emotions—hope, love, self-respect, pity, snobbery, generosity, ambition, sense of humour—and it must be firmly rooted in truth. Furthermore it must be designed to interest and convince the particular social group which it seeks to influence.

A new and important factor made itself felt in advertisement production—the advertising agent. Originally the advertising agent had operated almost entirely as a canvasser of advertisements for the newspapers, from whom he

received a commission upon the business which he obtained. Now he began to function as an adviser. He became a *practitioner* in advertising. Soon it was realized that the advertising agency was to occupy a key position in the business world. Acute and educated minds were gradually attracted to the agencies as writers, designers, artists, statisticians and psychologists, and in many other expert capacities. Today the advertising agency has become a highly skilled creative unit without which few advertisers would wish to operate.

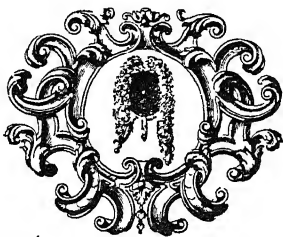
A Social Force

Advertising has become such a potent social force that it is employed upon tasks of wide variety. It is used not only by manufacturers and merchants, retail stores and mail order houses, but also by Government departments, political parties, and organizers of charitable appeals. Nation-wide advertising campaigns have been built round such slogans as "Eat More Fruit."

Present-day advertising may be divided into seven major subsections: press advertising, outdoor advertising, display, printed matter, postal advertising, film, and radio advertising. These are used collectively or individually, as circumstances demand, but the advertiser usually supports his main campaign by at least one other medium.

PRESS ADVERTISING. This comprises the advertisements which appear in the daily, evening, and weekly newspapers, the magazines and journals, and the trade and technical periodicals. Press advertisements account for by far the greatest volume of advertising expenditure, and the reason for this is not difficult to see. No other method makes it possible for an advertiser to put a written message before many millions of potential customers in a few hours. Several of the national newspapers have circulations exceeding two million copies per issue, and rates are naturally high.

If an advertiser is to obtain the best return for his money, he must have a clear conception of the people who read the papers in which he places his advertising. To this end, independent surveys are periodically made, as many



Thomas Gibbons.
Peruke Maker.

at the Blew & White Peruke,
in Rosemary Lane.

LONDON

Makes and Sells all sorts of Perukes
Wholesale & Retail, at Reasonable Rates.

At the best of left off Niggers Sold Wholesale & Retail.

Advertising. Wood-engraved trade card of the 18th century, with engraving by Hogarth

Pears' soap.



Two years ago I used Pears' Soap. Since then I have used no other!

Advertising. This famous "Punch" joke-drawing by Harry Furniss was first used as an advertisement in 1885

as 50,000 people being interviewed to obtain a true cross-section of the reading tendencies of the British public. From an analysis of these surveys it is possible to discover the exact composition of the readers of each individual publication, their sex, their ages, and their purchasing capacities, based upon earnings. An advertiser, having found by market research in what group of the community he is likely to find his customers, then selects a list of publications that will reach the correct group with the least possible wastage of circulation.

Most advertisers use the medium of the press. Out of a total of £30,000,000 estimated to have been spent in 1938, advertisers of food and drink accounted for 18 per cent, household supplies for 13 per cent, medicines for 11 per cent, wearing apparel for 11 per cent, motoring and travel for 10 per cent, toilet articles for 10 per cent, and cigarettes and tobacco for 6 per cent. Other big users of newspaper advertisements are the department stores.

Press advertising is essential where the advertising contains a news message which must be speedily conveyed to the public or where a quick response is required. The newspapers are specially effective for this type of advertising because of their frequency of publication and their

widespread circulation. Magazines and periodicals, on the other hand, particularly those which devote themselves to special interests, offer the advertiser an opportunity of reaching clearly defined groups of people, such as housewives, motorists, professional classes, fashion-conscious women; and they have the added advantage of a considerably longer "life" than newspapers.

OUTDOOR ADVERTISING. This category embraces posters on hoardings, railway stations, vans, bus sides; enamel iron plates; showcards in trains, buses, and tramcars; sandwich boards; electric and neon signs; skywriting and banners towed by aeroplanes. (See Poster.)

Poster advertising on outdoor sites does not lend itself to the conveyance of long or detailed messages. It is, therefore, regarded as "reminder" advertising. The advertiser tells his story in full in the press, and by means of outdoor advertising he drives home repeatedly a short message which is the essence of the press campaign. An experienced advertiser is careful to see that there is a link between his press advertising and his outdoor advertising, in the form of either a slogan or a style of illustration; so that the reader

displays are usually passed on from one retailer to another so that their life may be as remunerative as possible.

CATALOGUES, FOLDERS, AND LEAFLETS. The success of this method of advertising depends largely upon the mode of distribution. The advertiser who keeps his printed matter until it is asked for by a potential buyer is ensuring against waste, but severely restricting his advertising opportunity. On the other hand, indiscriminate distribution of leaflets by door-to-door or hand-out methods can be costly and wasteful of material. The best results are usually obtained when the advertiser's printed material is offered in press or radio announcements, or alternatively by distributing the material direct to people who are known to be likely customers.

POSTAL ADVERTISING. Apart from the distribution of printed matter such as is described above, postal advertising can take the form of a circular letter unaccompanied by any other enclosure, or even a postcard. Direct mail advertising is most profitable when it is circulated to specially compiled lists of prospective respondents. These may be people who have already shown interest in the advertiser's proposition, e.g. by an earlier purchase, or, in the case of advertising by local traders, those whose geographical position makes them likely customers.

Postal advertising can also be profitable to advertisers selling to definite and known sections of the community, such as engineers, builders, architects, lawyers, doctors, and nurses. Organizers of charitable appeals, who make frequent use of the post, generally address their messages to people who are



Rowland's Macassar Oil

has been for 100 years recognized as the best and safest preserver and beautifier of the hair, and is far preferable to other hair restorers which are really poisonous dyes, and deposit a sediment on the scalp which fills up the pores. It promotes and beautifies the hair, arrests baldness, removes dandruff, and is the best restorative for the whiskers and moustaches, and being most beautifully perfumed, is a perfect toilet luxury for everyone. Also sold in a golden colour for fair-haired ladies and children.

Bottles, 2s. 6d., 7s., 10s. 6d.

Advertising. Typical example of the simple kind of advertisement found in 19th century newspapers

of the newspaper advertisement, on seeing the poster or sign or showcard, is quickly reminded of the full message which he has read previously.

DISPLAY. In late years display has reached a very high state of efficiency, and specially trained men and women are employed on this work. The big stores employ their own display staffs, who devise original and artistic displays for their windows and interiors. The big manufacturer, selling through many outlets, has displays manufactured and distributed to the shops. Elaborate

already known to have been contributors to similar appeals.

FLM ADVERTISING. Many cinema proprietors allot a certain period of time during each programme to the showing not only of advertisements on lantern slides but of advertising films, and advertisers have been quick to seize this opportunity to convey their message graphically to a very large public. The danger to be avoided in this form of advertising is resentment on the part of the audience, who, having paid for admittance, may feel that they are having an advertisement

foisted upon them in place of the entertainment for which they have paid. Therefore great care is taken by advertisers in the production of these films to ensure that they do provide entertainment, sometimes in a humorous manner and sometimes by virtue of their technical or topical interest. During the Second Great War the various government departments took full advantage of film advertising.

RADIO ADVERTISING. The development of radio advertising, so marked a feature of American life, has been complicated in the U.K. by the restriction placed upon the B.B.C. in the matter of sponsored programmes or the selling of "time" on the air for commercial purposes. This led to the opening of advertising concessions from foreign stations easily heard in this country, whereby British advertisers were able to broadcast programmes in English. Leading variety artists were attracted to these programmes by the generous fees paid by advertisers, and at the outbreak of war in 1939 it was estimated that at least five million listeners in the United Kingdom were in the habit of tuning in to advertising programmes from Luxembourg, Fécamp, etc. (See Broadcasting.)

Like the poster, radio advertising is limited in the opportunity it offers for telling a detailed story. The listener will not tolerate an excess of sales talk, and this means that radio is often used as "reminder" advertising in support of other media.

PLANNING THE CAMPAIGN. The intending advertiser, having assured himself that he is in a position to meet the increased demand which he hopes to create, must next determine the amount of money which can profitably be devoted to the campaign. In this matter the advertising agency is usually able to give good advice. One of the first decisions must be the form of appeal. How far shall it be informative, and how far persuasive? Shall the persuasive appeal be mainly to the emotions, or to reason, or to both? The agency then prepares preliminary rough designs, or "visuals," of the advertisements, posters, showcards, cartons, etc., and the text, or "copy," is written. Then comes a conference with the advertiser before proceeding to finished art work, photographs, and typesetting. Simultaneously the agency will have prepared the detailed estimate of cost,

divided into the various forms of advertising which are to be employed.

After approval, the agency makes itself responsible for booking space in the press, arranging contracts with the billposters, and negotiating and supervising the printing or other media to be employed. A schedule is prepared showing the publication dates of the advertisements. When the advertisements begin to appear in the press or on the hoardings, they are carefully watched and checked by the agency, which also checks the accounts before passing the charge to the advertiser. As the campaign progresses, the advertising agency seeks information from the advertiser regarding the results obtained. Such information is weighed and analysed and, where necessary, the advertising is adjusted to make it more effective.

ORGANIZATION AND CONTROL. Much is being done by the organization of advertising interests to strengthen and improve the value of advertising both to the public and to those who employ it as an implement of business. The Advertising Association and the Newspaper Proprietors' Association both have vigilance committees which maintain a careful watch upon press advertising claims generally. This assists in the elimination from the newspaper columns of advertisements of undesirable products, as well as keeping within bounds those claims made on behalf of reputable merchandise. A similar censorship of poster claims is maintained by a joint committee operated by the British Poster Advertising Association and the London Poster Advertising Association. These associations also concern themselves with the selection of poster sites, with a view to the protection of public amenities. Standards of practice among advertising agents are the concern of the Institute of Incorporated Practitioners in Advertising, which includes nearly all the reputable agencies in its membership.

These efforts have been materially supported by Government legislation. In 1944 the Ministry of Food took over from the Ministry of Health those provisions of the Food and Drugs Act which forbid false or misleading claims on labels or advertisements. The Labelling of Food Order, 1944, re-enacted those provisions, and in addition imposed a strict measure of control

upon the claims of vitamin and mineral value. The Order also required disclosure of ingredients in manufactured foodstuffs under a wide range of headings.

THE SECOND GREAT WAR. The outbreak of war in 1939 instantly reduced the volume of commercial advertising to a mere trickle. Advertisers were uncertain how the impact of war would affect their supplies and trading, and although a revival after a month or so of hostilities had shown that the declaration was not to be followed by a cataclysm of the life of the community, the growing shortage of paper reduced the opportunity to advertise, and publishers were compelled to impose rigorous restrictions on the amount of space which could be allotted to any one advertiser.

Government Advertising

To aggravate the situation further, a new competitor entered the field with a growing demand for more and more advertising space—the Government—which for obvious reasons was granted priority.

The Ministry of Information grew almost overnight from a small nucleus to a great organization with a major section devoted to the preparation and control of most of the Government appeals and directions. Posters appeared on the hoardings carrying such slogans as "Freedom is in peril, defend it with all your might" and "Your courage, your devotion, your resolution, will bring us Victory." The National Savings Committee intensified its efforts to encourage war savings and check private expenditure, the Ministry of Home Security publicised Air Raid Precautions, the Service Ministries stimulated recruitment, and the Ministry of Food turned to advertising in all its forms for help to safeguard the nation's larder and to give valuable advice to housewives on the best use of rations.

At first the advertising essays of the Government mainly took the form of exhortations. But it was soon found that the nation was in no need of any such elementary stimulant; and taking several leaves out of the commercial advertisers' book, Ministries began to reason and explain. A notable example of this "adult" advertising was the Ministry of Food's weekly issue of an advertisement under the title "Food Facts." This contained the latest Ministry of Food news. It told the nation

how to register with retailers; periodically it told them how to get their ration books; it introduced the points system; it stimulated the consumption of potatoes when supplies were abundant; it encouraged economy when potatoes were scarce; it broadcast many hundreds of recipes to make dull menus brighter. Its imaginative conception took such a hold on the people that a vast correspondence grew out of it, and housewives all over the country collected the advertisements every week so that they could refer to them when occasion arose. "Food Facts" first appeared in July, 1940, and continued weekly throughout the war. (See National Savings.)

The shortage of newsprint called for heavy reductions in the size of newspapers and periodicals. Daily newspapers which had run to 24 and even 32 pages had to compress news and advertising into four pages, and commercial advertisers had to be content with smaller spaces. However, as all advertisers except the Government were subject to the same restrictions, no one advertiser was able to overshadow others merely by virtue of magnitude; and typographers, designers, and writers had to rely upon talent to secure the attention they desired. This task was made easier by the fact that few advertisers had any need to stimulate sales, so continued to advertise principally to maintain the goodwill which they had created before the war and to keep names green in the public memory.

Outdoor advertising came almost to a standstill. The paper shortage impelled the Ministry of Supply to issue restrictive orders concerning the printing and displaying of posters relating to the sale of goods. These restrictions, of course, did not affect the Government, who, apart from a few advertisers who had stocks of posters printed before the war, soon became the only exhibitors of posters on the hoardings.

Film advertising was affected by restricted supplies of film stock and processing capacity,

MINISTRY OF FOOD



THE WEEK'S

FOOD

FACTS N°1



There will be more advertisements in this series. It will be well worth your while to collect them. As each appears, pin it up in your kitchen.

GROW fit not fat on your war diet!

Make full use of the fruit and vegetables in season. Cut out "extras"; cut out waste; don't eat more than you need. You'll save yourself money, you'll save valuable cargo space which is needed for munitions, and you'll feel fitter than you ever felt before.

ON THE KITCHEN FRONT

Advertising. The first of the Ministry of Food's regular exhortations during the Second Great War. Austerity recipes and hints on kitchen economy were appended

and commercial advertising films almost disappeared. Here again, however, the Government took advantage of its privileged position. Apart from a number of five-minute films made by the Ministry of Information, there were occasional full-length feature films dramatising the war stories of the various Services. At the other end of the scale came the weekly "flashes" produced by the Ministry of Food, and other "flashes" produced by the National Savings Committee and the Ministry of Fuel and Power. The cinema exhibitors patriotically gave screen time free of charge to these Government films.

Radio advertising, already limited to stations outside the United Kingdom, disappeared with the German occupation of the Continent. Illuminated signs were extinguished by the blackout. Catalogues, booklets, showcards, and printed displays practically disappeared owing to the scarcity of paper and cardboard.

It was left, therefore, for newspapers and periodicals to be the mainstay of the advertiser, whether Governmental or private, and they

performed their task ably and fairly. Advertising played an important part in the life of the nation at war; the morale of the home front was supported and the goodwill of the nation's traders protected by the intelligent and courageous use of the printed word.

Advocate (Lat. *ad*, to; *vocare*, to call). Term common to all members of the legal profession when representing a client before any court or tribunal. In England and Ireland barristers can appear anywhere. Solicitors cannot appear in the House of Lords, Privy Council, Court of Appeal, or the High Court; nor at a quarter sessions except where there is no Bar.

The relations between an advocate and his client are absolutely confidential, and not even a court of law can compel the disclosure of any communication between them. The advocate, in conducting a case, can make admissions that bind his client, but he cannot compromise the case without the client's permission; short of this, however, he can refer to arbitration, or otherwise do what he thinks in his client's interests. The utterances of an advocate in conducting a case are absolutely privileged. The only restraints imposed are by the influence of the judge and of the general opinion of his professional brethren; and in a criminal prosecution, if he is prosecuting, by the rule that a prosecuting counsel must regard himself as a minister of justice. An advocate's duty is to do his best for his client, regardless of the consequences to anybody else, provided he fights "with the sword of the soldier, and not with the dagger of the assassin."

The word was first used by the Romans, and until 1857 had a distinctive use in England. Until then it was given to those who practised in the ecclesiastical courts, men who were licensed to do so by the archbishops, and formed a separate legal college. This was swept away when ordinary barristers began to practise in these courts.

In Scotland the word advocate is still used in a narrower and more definite sense. There the advocate is a member of the higher branch of the legal profession, the equivalent of the English barrister. To become an advocate one must pass certain examinations and pay certain fees, arranged and controlled by the Faculty of Advocates. The examinations are first in general subjects and afterwards in law. In France also the

word, under the form *avocat*, is used in practically the same sense as in Scotland, both having borrowed it from Roman Law.

Advocates, FACULTY OF. Corporation which controls admission to the Scottish Bar. All advocates must be members of the faculty, as only those who are can plead before the Court of Session. It dates from 1532, when a College of Justice was founded in Scotland. The head of the faculty is a dean, elected annually; he, with the other officials, makes regulations for the examination of intending advocates. Its headquarters are at Parliament Square, Edinburgh. The great library of the Faculty of Advocates, founded in 1682 and containing many valuable MSS. relating to the history of Scotland, became the National Library of Scotland in 1925. See Libraries.

Adwoson (Lat. *advocatio*, legal aid, patronage). Right of presenting to an ecclesiastical living—e.g. a rectory or vicarage. It is a form of heritable property. It may be attached (appendant) to other property, as where the lord of the manor of X has the right to present the rector of the parish of X; or it may exist as a right independent of other property. The owner of the adwoson is called the patron of the living. An adwoson, unless attached to other property, may not be sold after two vacancies have occurred in the benefice subsequent to July 14, 1924. The Diocesan Board of Patronage has certain rights to purchase compulsorily any rights of patronage offered for sale. The patron has the right to prevent the incumbent from wasting church property. Where an adwoson is held in trust for X, the presentation is made by the trustees, but X nominates the person to be presented. A patron must not take money for presenting a clergyman to the living.

Adye, SIR JOHN MILLER (1819-1900). British soldier. Born at Sevenoaks, Kent, Nov. 1, 1819, Adye became an artillery officer, and went through the Crimean War and the Indian Mutiny. He held administrative posts in the Indian

and British Armies, and in 1882 went to Egypt as chief of the staff to Wolseley. He was made a G.C.B., was governor of Gibraltar 1883-6, and died Aug. 26, 1900. Adye wrote several books on military subjects. *Pron.* ad'y.

Adytum (Gr. *a*, not; *dyein*, to enter). Term anciently used to denote an inner sanctuary. For instance, it was the part of a temple which only the priests were allowed to enter, and where oracles were delivered.

"A. E." Pen-name of the Irish poet, George William Russell (*q.v.*).

Aecus. In Greek legend, son of Zeus by the nymph Aegina, and king of the island named after her. The father of Telamon and Peleus, he was renowned for his integrity and justice, and after his death, with Minos and Rhadamanthus, was made by Pluto one of the judges of the underworld.

Aedile (Lat. *aedes*, a building). Roman magistrate. In republican times the chief duties of the aediles were the superintendence of public buildings and of the water supply, direction of the police, provisioning of the city, management of public games, and care of the public archives. Instituted 494 B.C., they were at first two in number, both plebeians; but in 366 two more, called curule, from being privileged to sit in a curule chair (*q.v.*), were appointed. The curule aediles were at first patricians. Under the Empire their functions were greatly curtailed, and the office itself disappeared before the time of Constantine. *Pron.* ē'dil.

Aedui or **HAEDUI.** Celtic tribe, living between the Loire and the Saône. They were the first Gallic people to join the Romans, and were treated with special regard by Caesar, who defended them against external foes.

Aeetes. In Greek legend, king of Colchis, in Asia Minor, and possessor of the Golden Fleece. Jason and his Argonauts were assisted in their search for it by the daughter of Aeetes, Medea. See Golden Fleece; Jason.

Aegades Islands (anc. *Aegates*; Ital. *Egadi*). Three mountainous islands, Favignana, Maritimo, and Levanzo, off the W. coast of Sicily. They were the scene in 241 B.C. of the defeat of the Carthaginian fleet by the Romans under Gaius Lutatius Catulus. Goat rearing and tunny fishing are the chief industries. Pop. 7,000.

Aegaeon. In Greek mythology, an alternative name for Briareus. He was one of the giants who assisted Zeus against the Titans.

Aegean Civilization. Name given to the pre-Hellenic civilization, including the Minoan, Cycladic, and Mycenaean cultures. Its chief centres were Cnossus and Phaestus in Crete, the islands of Melos, Paros, and Naxos in the Cyclades, and Mycenae and Tiryns in Peloponnesus.

Crete was the first European land to attain high achievement in art. The term Minoan has been given to phases of Bronze Age civilization there, subdivided into three periods: Early (c. 3600-2100 B.C.), Middle (c. 2100-1600), and Late (c. 1600-1200). The golden age of Crete—in the Late Minoan period—lasted about a century (c. 1500-1400), towards the end of which the island was invaded by the Mycenaeans, and the palace at Cnossus burnt.

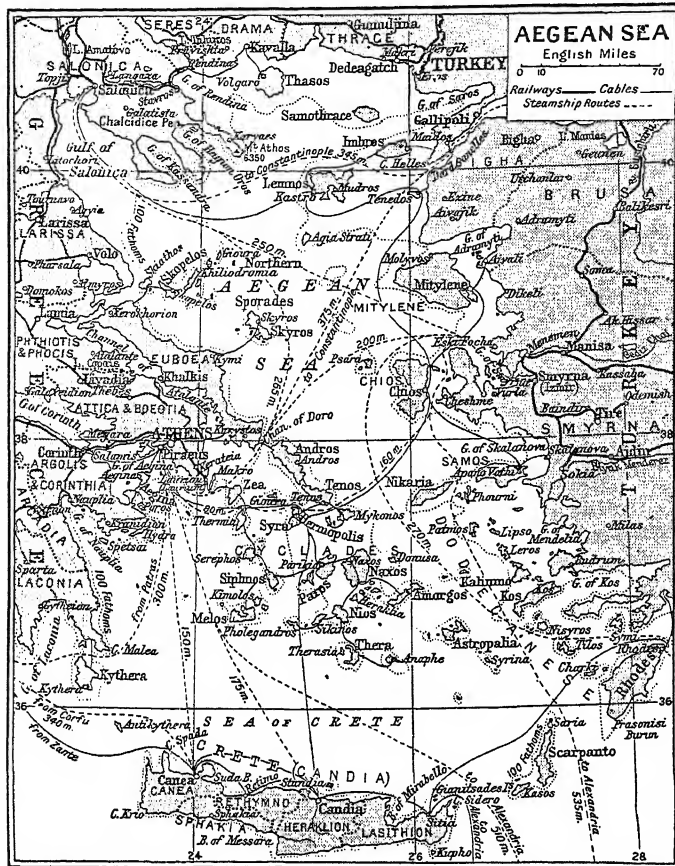
The Mycenaean culture was an offshoot of the great Cretan civilization. The evidence suggests that it was the result of conquest. There was no gradual Minoisation of the native community on the Greek mainland, but an abrupt and wholesale displacement of a lower by an incomparably higher culture. Mycenaean civilization ended with equal abruptness about 1000 B.C. as a result of the Dorian invasion from the north.

The excavations by Heinrich Schliemann at Mycenae (begun in 1876) and Tiryns (1884) contributed much to modern knowledge of Mycenaean domestic and religious life, but his conviction that Crete would produce even more important results has been fully justified by the discoveries, since 1894, of Sir Arthur Evans and others.

The remains of the palace at Cnossus, Crete, exhibit architectural talent of a high order. Most interesting are the Throne Room, the Hall of the Double Axe, possibly the fetish of some divinity, and the Queen's Hall, with frescoes representing religious processions, bull fights, boxing contests, and other scenes from national life. Explorers have been struck by the excellence of the sanitary arrangements indicated, and the similarity of the female attire to that of a modern society lady. The early non-Aryan inhabitants of Crete probably belonged to the so-called Mediterranean race, distinguished by long heads, dark complexions, and shortness of stature. They at first used a pictorial system of writing, and later, linear signs; numerous specimens have been discovered



General Adye,
British soldier



Aegean Sea. It separates Greece from Asia Minor and is studded with islands. The Dodecanese were of some strategic importance in the Second Great War

but not deciphered. Essentially a seafaring people, they carried on an extensive commerce, especially with Egypt. Frescoes on the tomb of an Egyptian viceroy represent Keftiu, by whom Cretans undoubtedly are meant, bringing tribute to Thothmes III (1500-1450 B.C.). The chief industries were pottery and olive oil. The Cretans were skilled carpenters and metal-workers, but agriculture seems to have been little practised. They had a metal currency and a system of weights of Babylonian origin. The chief Cretan divinities were two, the most important a nature-goddess, with a younger male subordinate, the former identified with various Hellenic goddesses, the latter with Zeus.

Bibliography. Crete, the Fore-runner of Greece, H. B. Hawes, 1911; The Oldest Civilization of Greece, H. R. Hall, 1901; The Palace of Minos at Knossos, Sir Arthur Evans, 1921, and 1928; History of the Ancient World, M. Rostovtzeff, 1926; Dawn of

European Civilization, V. Gordon Childe, 1925.

Aegean Sea OR GREEK ARCHIPELAGO (Gr. *archipelagos*, chief sea). That part of the Mediterranean which lies between Greece and Asia Minor. Its length N. to S. is about 400 m., its greatest breadth is about 170 m. In parts very deep, more than 7,000 ft. having been sounded in the S. basin, its navigation is hazardous and difficult. The waters abound in fish and sponges. The chief of its numerous islands are Euboea (the largest), Mitylene, Thasos, Samothrace, Imbros, Lemnos, Chios, Samos, the Sporades, and the Cyclades.

The Dodecanese (*q.v.*) are, as the name implies, a group of 12 Aegean islands (13 if Rhodes is included) first occupied by Italy in 1912 and restored to Greece in 1947. During the Second Great War, naval and military bases in the Dodecanese were frequently attacked by British aircraft, and

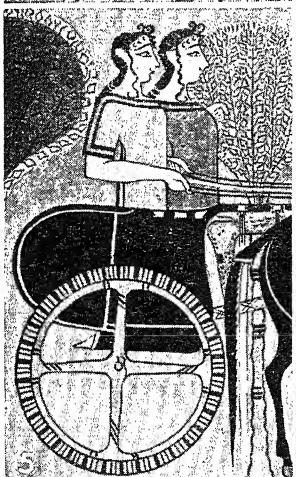
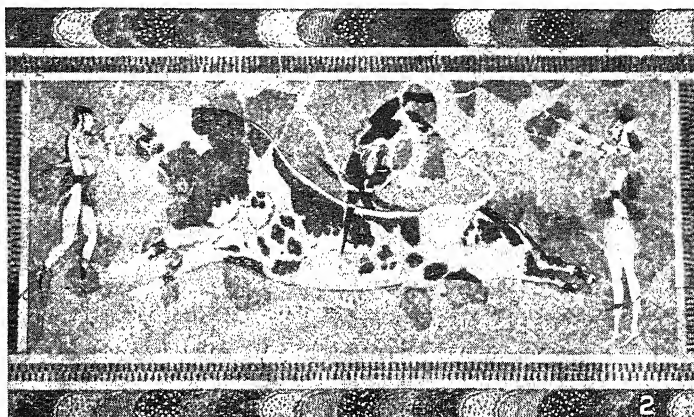
there was considerable bombing of Axis shipping. After the fall of Greece in 1941, all the islands were controlled by Italo-German garrisons. It was hoped that they would be immediately liberated with the capitulation of Italy to the Allies in 1943, and British forces were landed on Kos, Leros, and Samos. But the Italian commander on Rhodes surrendered to the Germans on Sept. 3, and this led to the assertion of German domination of Kos, Leros, and Samos. The liberation of Athens in Oct., 1944, reversed the position. On Sept. 9 British and Allied warships had launched a campaign for the destruction of all German-controlled shipping in the Aegean. Naxos, Lemnos, Karpathos, and Santorini were occupied in Oct., and with the liberation of the Greek mainland, Dec., 1944, German garrisons on other islands (some 20,000 men) were marooned. They surrendered in May, 1945.

Aegerine OR ACHMITE. Green to brown natural silicate of sodium and iron. It is an alkaline member of the group of monoclinic pyroxenes, and is found only in igneous rocks that contain an unusually high percentage of alkalis, especially of soda.

Aegeus. In Greek legend, king of Athens and father of Theseus. On returning from Crete, whither he had gone to deliver Athens from the tribute to the Minotaur, Theseus forgot to change his black sails for white, the agreed signal of his success. Aegeus, seeing the black sails, threw himself into the sea, which, according to tradition, thereafter bore the name of Aegean. See Minotaur.

Aegina. Island and ancient city of Greece in the Saronic or Aegina Gulf. About 40 sq. m. in area, it is mainly rugged, fertile though stony on the W., produces cereals, wine, and fruit, manufactures pottery, and has a valuable sponge fishery. The city, conquered c. 456 B.C. by the Athenians after a nine months' siege, dates back to pre-Dorian times. Some remarkable sculptures were excavated from the ruins of the temple of Aphaea in 1811 and taken to the Glyptothek at Munich. Pop. island, 8,500; city, 4,500.

Aegina, GULF OF, OR SARONIC GULF. Opening of the Aegean Sea in S.E. Greece. About 50 m. long and 35 m. wide, its islands include Aegina and Salamis. Its N.E. and N.W. divisions are called Eleusis Bay and Kekkries Bay respectively. The shores, deeply indented, have good harbours.



1. Late Minoan vase ornamented with a realistic octopus (c. 1600-1500 B.C.). 2. Bull-fighting at Knossos on a fresco. 3. Throne from the Palace of Minos, in white stone with leaf-shaped back (1550-1400 B.C.). 4. Ivory and gold statuette of the Minoan Snake Goddess (c.

1500 B.C.). 5. Fresco from Tiryns, a Greek prehistoric site (c. 1400 B.C.). 6. Lion Gateway at the great citadel of Mycenae (after 1400 B.C.). 7. Carved steatite vase (c. 1600 B.C.) from Hagia Triada, Crete, showing vigorous groups of boxers

AEGEAN CIVILIZATION IN CRETE AND GREECE ABOUT 3,500 YEARS AGO

Aegir. In Norse mythology, the giant of the seashore. He was the husband of Ran, the storm giantess, and father of nine daughters—the billows. He visited the gods in Asgard and asked them to feasts in his hall on the island of Hler. Angry with Thor, he demanded from him the possession of the giant Hymir's mile-deep cauldron in which to brew ale for them all. The name is also applied to the bore or tidal wave on the English river Trent.

Aegis. In Greek mythology, the shield of Zeus and other divinities. The word now has the general meaning of protection.

Aegisthus. In Greek legend, son of Thyestes and cousin of Agamemnon. During his cousin's absence at the siege of Troy, Aegisthus carried on an intrigue with his wife Clytaemnestra. On his return Agamemnon was murdered by them, a crime avenged later by Agamemnon's son Orestes.

Aegium or **AEGION.** Town of Greece. On the S. shore of the Gulf of Corinth, it has an excellent harbour. It was the capital of Achaea, the meeting place of the twice-yearly assembly of the Achaeans (q.v.). It is also the legendary birthplace of Zeus.

Aegospotami, **BATTLE** OF. Fought in 405 B.C. at the mouth of a river in the Thracian Chersonese of the same name, between the Athenian fleet and that of the Spartans under Lysander assisted by a Persian squadron. The defeat of the Athenians destroyed their naval supremacy and deprived them of the hegemony of Greece. The name Aegospotami means goat-rivers.

Aegrotat (Latin, he is ill). Phrase used at universities and other educational establishments for a certificate excusing a student from work or college duties on account of illness. A student unable to complete the work of an examination for this reason may be given an aegrotat or pass certificate, the examiners being satisfied that but for illness he would have passed in the ordinary way.

Aehrenthal, **COUNT ALOIS VON** (1854-1912). Austro-Hungarian statesman. Born Sept. 27, 1854, at Grosskal, in Bohemia, he studied at Prague and Bonn, and in 1877 entered the diplomatic service as attaché at Paris. He was at St. Petersburg as



Count Aehrenthal,
Austrian statesman

attaché, 1878-83, as councillor of legation, 1888-94, and as ambassador, 1899-1906; in 1895-99 he was envoy extraordinary at Bukarest. In Oct., 1906, he succeeded Count Goluchowski as foreign minister, and in 1908 startled Europe by the annexation of Bosnia and Herzegovina. He was identified later with the peace party. He died Feb. 17, 1912.

Aelfric (c. 955-1022). English scholar. A pupil of Ethelwold, first at the Benedictine monastery of Abingdon and then at Winchester, he was made abbot of the new monastery of Cerne Abbas, Dorset, in 987, and later head of the Benedictine monastery at Eynsham, near Oxford, where he died. His main works include 80 Homilies, his Colloquium, a Discourse on the occupations of monks, and translations of the books of Genesis, Numbers, Deuteronomy, Judges, Esther, Job, and Judith. In the controversies of the 16th and 17th centuries certain passages from Aelfric's works were quoted by the reformers as anticipating the denial of the doctrine of transubstantiation. See Aelfric, C. L. White, 1898.

Aelia Capitolina. Name given to the city built by the emperor Hadrian, c. A.D. 130, on the site of the ancient Jerusalem, which had been destroyed by Titus, A.D. 70. It was called Aelia Capitolina from Aelius, the family name of Hadrian, and from its temple dedicated to Jupiter Capitolinus. Hadrian made it a Roman colony. See Jerusalem.

Aelianus Tacticus. Greek military writer. He lived in the 2nd century A.D. and wrote a treatise on military tactics, which was regarded as a useful text-book until modern times. The tactics described are those of the Macedonians after the time of Alexander the Great. There are English versions by J. Bingham, 1616, and Viscount Dillon, 1814.

Aelfred or **AETHELRED** (c. 1109-66). English writer and saint. Born at Hexham, he spent his youth at the court of David, king of Scotland. He became a Cistercian monk and was abbot of Revesby in Lincolnshire, 1142, and of Rievaulx in Yorkshire, 1146. A friend and adviser of Henry II, he made a name as an evangelist to the Picts of Galloway. His chief historical writings, all in Latin, are *The Life and Miracles of S. Edward, King and Confessor*; *On the Battle of the Standard*; and *A Chronicle from Adam to Henry I.* He died at Rievaulx, Jan. 12, 1166, and was canonised in 1191.

Aemilian Way, **THE,** OR **VIA AEMILIA.** Highway in ancient Italy. Made in 187 B.C. as a continuation of the Flaminian Way by the consul Marcus Aemilius Lepidus, after whom it was named, it ran across the northern flanks of the Apennines from Ariminum (Rimini) to Placentia (Piacenza) and Mediolanum (Milan), a distance of more than 180 m. Continued later to Aquileia, parts of it are still used. It gave its name to the province of Emilia.

Aeneas. In classical legend, Trojan hero. According to the story in Virgil's *Aeneid*, after the fall of Troy he escaped with his father Anchises and his son Ascanius or Iulus. After much wandering he was driven by a storm to Carthage, where he won the love of Dido, its queen, who, being abandoned by him, committed suicide. He afterwards made his way to Latium in Italy, where Latinus, the king, promised him his daughter Lavinia in marriage. Turnus, a native chief and former suitor of Lavinia, refused to give her up; war ensued between the rivals and Turnus was killed. Aeneas married Lavinia and became the ancestor of the Romans. Killed in battle while fighting against the Rutulians, he was worshipped as a god. See Virgil.

Aeneas Silvius. Name by which Pope Pius II (q.v.) is frequently known. His full name was Aeneas Silvius de' Piccolomini.

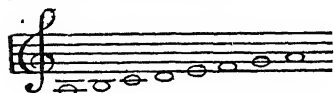
Aeneid. Epic poem in twelve books by the Roman poet Virgil. Based on the legendary adventures of the Trojan hero Aeneas after the fall of Troy, it is really a glorification of Rome and of the Julian house to which the Emperor Augustus belonged, and as such became the national epic. Modelled on Homer's *Iliad* and *Odyssey*, it ranks with the greatest poetry of all time. Best edition of text with notes, by J. Conington and H. Nettleship, 1881-3; Eng. prose trans. by Conington, 1872, J. W. Mackail, 1885; verse, John Dryden, 1697, William Morris, 1875. See Virgil.

Aenigmatite or **COSSYRITE.** Geological name for the only member of the amphibole group of minerals that has triclinic symmetry. It is a titanate-silicate of sodium, iron, and aluminium, and is confined to igneous rocks containing a high percentage of soda, such as the nepheline-syenites of Greenland. In these it occurs as black crystals several inches in length. Small crystals (cosyrite) occur in the lavas of the island of Pantellaria.

Aeolian Deposits (Lat. *Aeolus*, god of the winds). Deposits formed of wind-carried particles of varying degrees of coarseness. They have been formed on land surfaces and may be detected among the rocks of various geological periods. The chief Aeolian deposits are the sand dunes of coastal regions, the sands of deserts—e.g. Sahara—and the great loess deposits of Asia. Wind-blown sands are remarkable for the extremely rounded character (millet seed) and high superficial polish of individual grains.

Aeolian Harp. Musical instrument. It consists of a box containing wires or strings loosely stretched to produce musical notes when a current of air passes through them. A gentle breeze causes low notes to sound, and as the air current increases in intensity higher notes of the harmonic series are elicited.

Aeolian Mode. In music, an old church mode beginning on A and using only the natural notes, the white keys of the pianoforte. The scale, therefore, was like the present scale of A minor.



Its dominant was E. See Mode.

Aeolians. One of the three great branches of the ancient Greeks. They spoke a dialect distinct from that of the Dorians or the Ionians. The poets Alcaeus, Sappho, and Anacreon wrote in the Aeolic dialect. The original home of the Aeolians, who claimed descent from Aeolus, son of Hellen, was in Thessaly, but they spread to the other parts of N. Greece, and colonised the islands of Lesbos and Tenedos and a strip of land on the coast of Mysia in Asia Minor, afterwards known as Aeolis.

Aeolipile or **AEOLIPYLE** (Lat. *Aeolus*, god of the winds *pila*, ball). Mechanical toy, illustrating the reaction of the air upon an issuing stream of steam in producing circular motion. It is a hollow ball of metal with hori-

zontal tubular arms, bent at right angles. When partially filled with water and heated sufficiently to generate steam from the arms, the metal globe will rotate. The invention is ascribed to Hero of Alexandria.

Aeolotropy (Gr. *aeolos*, shifting; *trepein*, to turn). Alteration in the electrical, optical, and other physical qualities of a body due to change of position. Thus a tube could be given a twist which would alter its electrical conductivity, and would then be said to be aeolotropic in regard to its electrical conductivity. Iceland spar is a mineral which does not exhibit the same optical refractivity in all directions. Its condition is said to be one of optical aeolotropy.

Aeolus. In classical mythology, king of Aeolia, one of the Lipari Islands. He was the god of the winds, which he kept shut up in a mountain. According to Homer, he gave Odysseus (Ulysses), when starting on his voyage home, a bag containing the unfavourable winds. The bag was untied by one of the crew, the winds escaped, and the ship was forced to return to Aeolia.

Aepyornis (Gr. *aipys*, tall; *ornis*, bird). An extinct wingless bird of Madagascar. Related to the extinct moa and the existing apteryx of New Zealand, it stood about 13 ft. high, and its fossilised eggs, occasionally found in the marshes, are a foot long and correspondingly large in circumference.

Aequi. Ancient Italian tribe in the Anio valley. They were long engaged in hostilities with the Romans, by whom they were finally subdued in 304 B.C.

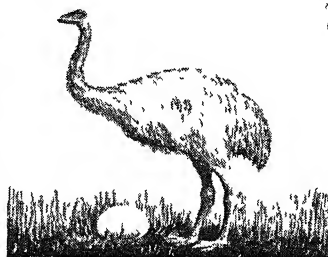
Aerarium (Lat. *aes*, money). Public treasury in ancient Rome, called aerarium Saturni, because the money was deposited in the temple of Saturn. Under the Empire the aerarium lost much of its importance, becoming the treasury only for the city itself and the senatorial provinces; the financial administration of the imperial provinces was a charge upon the fiscus, or emperor's private purse. At the beginning of the 2nd century A.D. the fiscus became the sole national treasury, the functions of the aerarium being confined to the city.

Aerated Waters. Beverages charged with an excess of carbonic acid gas (carbon dioxide) or, occasionally, oxygen. Aerated waters were originally made about 1767 in imitation of natural mineral waters, but the term now

includes beverages such as lemonade and ginger ale which contain no mineral matter.

Aerated waters were first made by machinery on a commercial scale early in the 19th century, the Struve patent (4,851 of 1823) being the earliest example of the machines employed. The essential apparatus consists of a carbonic acid gas generator, a gas-holder, a saturator, and a bottler. The carbonic acid gas is made by the action of sulphuric acid on whiting (calcium carbonate) or sodium bicarbonate, the advantage of using the sodium salt being that the by-product, sodium sulphate, is useful. In smaller installations and soda fountains, liquid carbonic acid gas, prepared by the complete combustion of coke, is employed.

When the gas is generated it is passed into the gas-holder and the pressure applied which is required in the subsequent operations. The saturator contains the water which is to be saturated with the gas. It is fitted with an agitator or mixer to ensure that the water shall take up the



Aepyornis. Reconstruction of the extinct bird which was 13 ft. high

maximum amount of gas. In practice four volumes of gas per volume of water is the amount allowed. If plain water is used in the saturator the product is simply aerated water, but for other varieties the different salts are first dissolved in the water. For soda-water 80 gr. of sodium bicarbonate per gallon is used; for potash water 32 gr. to 64 gr. of potassium bicarbonate; and for seltz r-water a mixture of the chloride, bicarbonate, sulphate, and phosphate of sodium.

For lemonade or ginger ale plain aerated water is required, as the flavouring and sweetening agents, in the form of a syrup, are placed in the bottles or syphons before the aerated water is added at the bottling machine. The kind of bottler employed varies according as corked or patent

stoppered bottles or syphons are being filled. Makers of aerated waters require a licence (10s. annually). The duty on sweetened table waters was abolished in 1924.

Aerial OR ANTENNA. In radio and television engineering, an elevated conductor or group of conductors from which high-frequency electro-magnetic waves are transmitted, or by which they are received. The simple aerial used for broadcast receiving sets consists usually of a horizontal wire, with or without a vertical continuation, supported on insulators. Other forms are frame aeriels used in portable receivers or direction finders; beam or curtain aerial systems on directional transmitting stations; and similar systems used for the reception of radiations from one direction only. An aerial functions as a transmitter of radio waves when high-frequency oscillating currents are fed into it; similarly, it converts electro-magnetic waves received by it into oscillatory currents, which are again converted in the receiver into audible or visible signals. See Radio; Television.

Aerobatics (Gr. *aerobatein*, to walk the air). Word coined during the First Great War to describe the various abnormal evolutions and trick manoeuvres carried out with aircraft in flight. When such flying was first developed in the years preceding the 1914-1918 war it was termed "stunting." Looping the loop, which is the best known aerobatic, was evolved by Pégoud, the famous French pioneer pilot, in 1913. He also introduced upside-down or inverted flying and the roll. In the latter the aircraft executes a complete revolution in the rolling plane.

During the period 1914-1918 many other forms of aerobatics were introduced. Amongst these are the half roll, the half roll on the top of a loop, the spin and the sideslip. In the half roll the machine turns over on to its back, the nose drops and, after the direction of flight has changed by 180 degrees, level flight is resumed at a lower altitude. In the manoeuvre known as the half roll on top of a loop the pilot flies his aircraft to an inverted position as though he were looping and, when upside down, returns to normal flight by turning right way up through rolling. Height is gained in the process and the direction is changed by 180 degrees. The sideslip is a manoeuvre in which

the aircraft descends at a forwards and sideways angle, the loss of height usually being very rapid. In the spin the aircraft descends vertically and rolls at the same time, so following a spiral track downwards.

The stall turn and Immelmann turn were other manoeuvres introduced in the first air war. The former consists of a rapid climb followed by a cartwheel movement and a dive towards the direction from which the machine had formerly been flying. The Immelmann turn, named after the German fighter pilot, was basically the same. The falling-leaf was yet another manoeuvre developed by airmen in the First Great War. It consisted of a descent (with the engine switched off or idling) when the up-and-down movement of a leaf fluttering to the ground was simulated by rocking the aircraft from side to side.

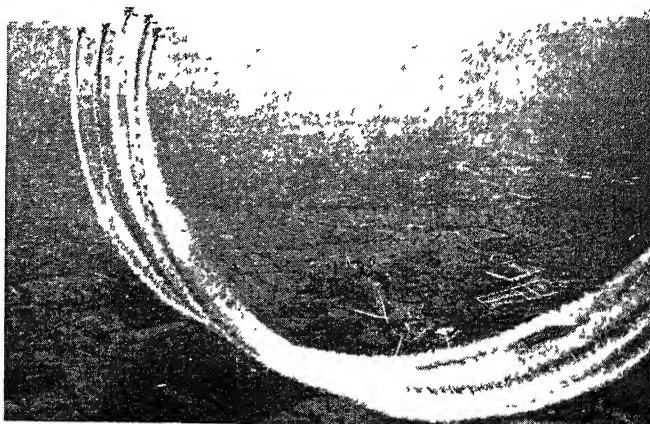
Marked progress was made in the art of aerobatic flying in the between-wars period. The bunt was a manoeuvre which became popular. It consists of pushing the aircraft into a vertical dive, flying it on to its back and then bringing the nose upward and over until level flight is resumed. The bunt is, in fact, an inverted loop. This trick and inverted turns, in which the aircraft follows a changing course when upside down and the pilot's head is outside instead of inside the turn, require great skill, nerve, and judgement. Yet another advanced aerobatic is the inverted spin. In this the pilot is on the outside of the spin and, as in the

bunt and inverted turn, forces are introduced which tend to hurl the pilot from the cockpit.

Aerobatics are taught in air forces mainly to instil confidence in the pilot and to assist him in acquiring a high standard of accuracy in his flying. Through this advanced training he learns to control his aircraft instinctively and correctly when some unforeseen position arises. There are occasions in air combat and operational flying when an aerobatic manoeuvre may save a critical situation; but experience shows that the chief value of aerobatics is that they aid an airman to gain mastery of his machine. Aerobatics are resorted to by test pilots when new types are being tested for strength and for the efficiency of the controls under varying conditions. See Aeronautics; Flight.

Aerobic (Gr. *aer*, air; *bios*, life). Biological term for micro-organisms which require the presence of oxygen to attain their proper growth and multiplication. Opposed to this is the term anaerobic, referring to organisms which will only grow in the absence of oxygen. The great majority of common organisms in nature, as well as many of the disease-producing germs, belong to the aerobic group.

Aero Club, ROYAL. British society for directing and encouraging sporting aviation. Registered in 1901, in its early years it organized balloon races from Ranelagh. When the aeroplane became a practical machine its activities were greatly extended and it became the official body



Aerobatics. Looping the loop, shown by means of "smoke" trails from five Bristol Bulldogs in a peace-time air display

Charles E. Brown

responsible for the issue of aviator certificates. The first aeroplane pilot's certificate was issued by the club to J. C. T. Moore-Brabazon (Lord Brabazon of Tara) on March 8, 1910. The Hon. C. S. Rolls (*q.v.*) received his certificate in the same month. The club, by the King's permission, assumed the title of the Royal Aero Club of the United Kingdom in 1910. It has been associated with such flying contests as the Aerial Derby Circuit of Britain, and the King's Cup Race. It played a large part in the encouragement of light plane flying clubs before the Second Great War. Its address is 119, Piccadilly, London, W.1.

Aerodrome (Gr. *aēr*, air; *dromos*, course). Original term applied to an aviation ground at which aircraft operate and are housed. Up to the beginning of the Second Great War aerodromes usually consisted of flat pasture land of differing acreage. In the early days of flying and during the First Great War they were of the simplest form, being grass-covered areas cleared of obstructions such as trees and hedges and often undrained. Hangars and workshops were primitive structures of wood or of the Besseneau fabric-covered wood-frame type.

The development of military aircraft, particularly the heavy bomber, necessitated marked changes in aerodrome planning and construction. The great all-up weights of these aircraft and their high minimum speeds during take-offs and landings called for a hard surface on the ground and a great increase in ground space available for these operations. Two or more runways built of concrete or tarmac and laid out according to the prevailing winds were therefore incorporated in the layout of service aerodromes. These runways may be thousands of yards long and link with concrete "aprons" adjoining the aircraft hangars. Perimeter tracks, similarly surfaced, are built around the aerodromes for aircraft to taxi to the starting-points before take-off and to be moved away from the runways after landing. Aerodromes constructed with extensive concrete aprons and runways began to be adopted to a limited extent some years before the war in a few countries where flat grass surfaces are not usually found. These aerodromes were termini for air lines. Coinciding with the development of aerodrome planning were important

advances in the design of aerodrome lighting, radio "beam" systems to assist airmen to land safely in darkness and bad visibility, and methods of obtaining fog dispersal (*q.v.*).

In the early days of flying there were fewer than a dozen aerodromes in Britain, and after more than thirty years some of these, through their long association with flying, carry historical interest. Brooklands aerodrome at Weybridge, Surrey, for example, was the scene of the pioneer work of such men as A. V. Roe (now Sir Alliot Verdon Roe) and T. O. M. Sopwith. The aerodrome at Hendon was opened in 1910 by Claude Grahame-White, the famous veteran airman.

During the Second Great War the word "aerodrome" tended to be replaced by the word "airfield," which is generally used in the United States to describe a flying ground. A terminal aerodrome is usually described as an airport. See Airfield; Airport; Hendon Aerodrome.

Aerodynamics (Gr. *aer*; *dynamis*, power). Branch of physics devoted to the study of the forces which air can exert on a body; because of either the motion of the body through the air or the motion of the air past the body. Every body moving through air creates a disturbance, and when the air currents resume their former flow behind the moving object, a partial vacuum is created which acts as a drag on the moving object.

Aerodynamically, the perfect shape to induce the minimum of air resistance is that of a drop of

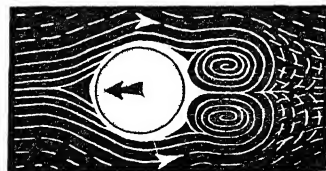


Fig. 1. Badly designed body : air flow forms eddies at rear

water, with the bulbous end in the direction of motion. As it moves forward, an object so shaped evenly parts the air which, flowing smoothly over the surface of the body without inducing any of the eddies that create resistance, slips off the tapered tail without creating a vacuum.

Air resistance is the prime factor in the limitation of the speeds of express railway trains and of racing motor cars. In the case of railway trains, doubling the speed squares the air resistance; when

speed is trebled, air resistance multiplies nine times, and so on until the air resistance attains a maximum which the train built on normal lines cannot overcome. This maximum is reached when the train speed is in the region of 100 m.p.h.

Applying the principles of aerodynamics to a railway train means that the front of the engine must be rounded in form, and all projecting parts recessed so that they will not project to create air resistance and thereby reduce speed, while the end of the rear coach must be swept back to a

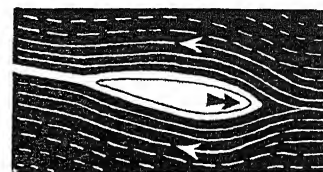


Fig. 2. Aerodynamically designed body : air flows with minimum of eddies

point. A notable example of a train designed on aerodynamic principles is provided by the Silver Jubilee express put into service by the L. and N.E. Rly in 1935.

One of the most important applications of aerodynamics is to the design of aircraft, and has resulted in better shapes for the main components such as wings and fuselage; smoother surfaces with the elimination of discontinuities that can upset airflow; abandoning of all external excrescences; the retraction of undercarriages; the enclosing of cockpits; and better design of engine cowling and cooling systems. A knowledge of aerodynamics is essential to determine such important factors as the strength of the aeroplane structure, the capability of the aircraft to carry its load, and the degree of its controllability and stability.

In its application, particularly to aircraft, aerodynamics is not an exact science, as many of the air forces acting on a body in motion are not directly calculable from first principles, but have to be determined by experiments in wind tunnels (*q.v.*). Application of aerodynamics to power-driven bodies not only reduces air resistance, but saves fuel consumption in motive power. Experiments have shown that if the modern aircraft could be designed aerodynamically perfect it could fly on one-third of the power now required. See Fairing; Flight; Head Resistance; Streamlining.

AERO-ENGINES: PISTON AND TURBINE

Captain Norman Macmillan, M.C., A.F.C.

This article records their development through forty years, from the experiments of the Wright brothers to the days of jet propulsion.

See also Internal Combustion Engine; Jet Propulsion

The production of the Wright brothers' first petrol engine—a four-cylinder water-cooled 12 h.p. unit driving two propellers by means of open chains, one of which was crossed to make the two air-screws turn in opposite directions to cancel out uneven torque—was the essential element in the world's first aeroplane flights on Dec. 17, 1903, for the brothers had previously solved the problem of control over flight by glider experiments but until they made their own engine, none existed which could convert their glider into an aeroplane.

The evolution of the aeroplane has followed the same course ever since, and the aircraft designer of today still awaits the production of prime movers which will enable him to improve his products in speed, range, and load-carrying.

The Earliest Engines

The Wrights' first engine weighed a little over 200 lb., a ratio of weight to power of about 17 lb./h.p. Their next step was to increase engine power and reduce the ratio of weight to power. Their second engine developed 16 to 17 h.p. and their third 20 h.p. Both weighed 240 lb. The effect was at once noticeable.

Their first machine weighed 745 lb. with pilot and flew at 30 m.p.h. Their second machine weighed 900 lb. and flew at 34 m.p.h. Their third machine weighed 925 lb. and flew at 38 m.p.h. The weight to power ratios of the three machines were 62 lb., 53 lb., and 46 lb. per h.p. By comparison the Lancaster bomber's ratio was 11.8 lb./h.p., while that of the American Thunderbolt fighter's was reduced to as little as 7 lb./h.p.

The second Wright engine had a weight to power ratio of 15 lb./h.p., and the third 12 lb./h.p. Their fourth engine developed 25 h.p. for about 10 lb. per h.p. The Wright "Cyclone 18" air-cooled radial engine of 1943 developed 2,000 h.p., its dry weight was 2,200 lb.—a weight to power ratio of 1.1 lb./h.p.

During the 40 years which elapsed between the first Wright engine and the "Cyclone 18" a great progressive variety of engines flew the skies, while the research for greater power and

the reduction in the weight to power ratio proceeded.

Air-cooled engines were soon in competition with the water-cooled engines of the Wrights.

The greatest early development of aero-engines took place in France. It was there that the 3-cylinder fan-shaped 25 h.p. air-cooled Anzani engine was made with which Blériot flew the English Channel on July 25, 1909. Another notable French engine of that early period was the 24 h.p. water-cooled V8-cylinder Levavasseur engine used in the Antoinette monoplane with which Latham endeavoured to emulate Blériot's cross-Channel flight.

One of the best British engines of that period was the 35 h.p. Green 4-cylinder water-cooled engine. In May, 1920, using a ten-year-old 35 h.p. Green engine, Hinkler flew non-stop from England to Turin in 9½ hours.

Early aircraft speeds were slow, and cooling was therefore inefficient for the first air-cooled engines. Blériot's 38 minutes' flight across the Channel was the longest ever made by the 25 h.p. Anzani, which usually overheated after about 20 minutes. But flying through a rain shower cooled Blériot's engine; his success was really a triumph for water cooling.

Rotary Engines

The search for more efficient air cooling produced the rotary engine. This engine had a fixed shaft around which the crank-case revolved, so that the radially disposed cylinders were cooled not only by the forward motion of the aircraft but also by their own movement.

The first rotary engines were French. The earliest model was the 34 h.p. 5-cylinder Gnome. The next model was the 50 h.p. 7-cylinder Gnome which drove Paulhan's winning Farman aeroplane in the 1910 London-to-Manchester flight for the Daily Mail £10,000 prize. Then followed a 7-cylinder 80 h.p. model. These engines had a mechanically operated exhaust valve in each cylinder head, and an automatically operated inlet valve in each piston head.

Fuel was fed into the crank-case through the fixed shaft and the gas found its way to the combus-

tion chamber via the somewhat unreliable piston valve.

Then came the 9-cylinder 100 h.p. Gnome Monosoupape engine, which retained the principle of one valve per cylinder head, but used inlet ports in the cylinder walls instead of the piston valve.

The 80 h.p. and 110 h.p. 9-cylinder Le Rhône, the 85 h.p. 7-cylinder Clerget, and the 110 h.p., 130 h.p. and 140 h.p. 9-cylinder Clerget engines all used two valves per cylinder head, one for inlet and one for exhaust. These rotary engines brought the weight to power ratio down to about 3 lb./h.p. and were widely used in the First Great War. The 80 h.p. Le Rhône that engined the Sopwith Pup weighed 240 lb. and could develop 93 h.p. at 1,200 r.p.m. The Monosoupape used in the Avro 504 and the D.H.2 developed 100 h.p. at 1,200 r.p.m. and weighed 300 lb.

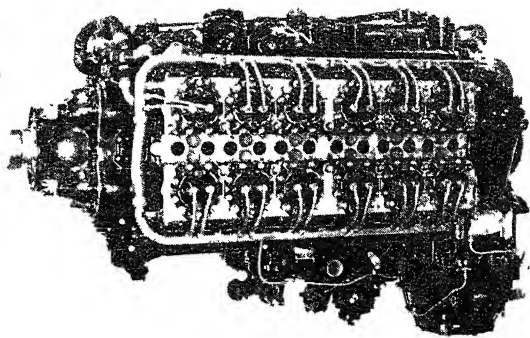
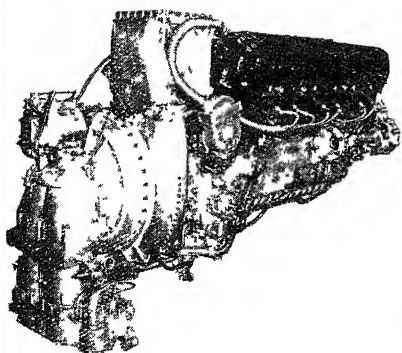
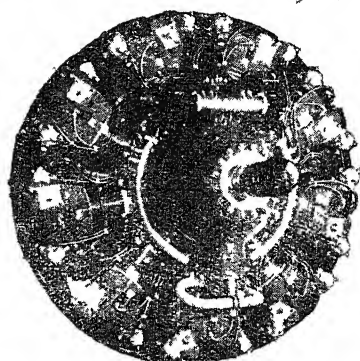
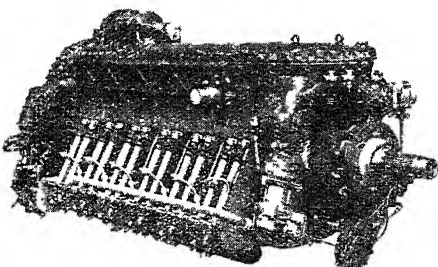
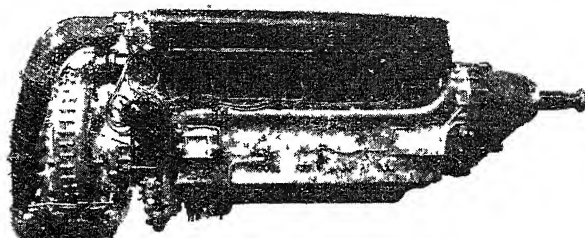
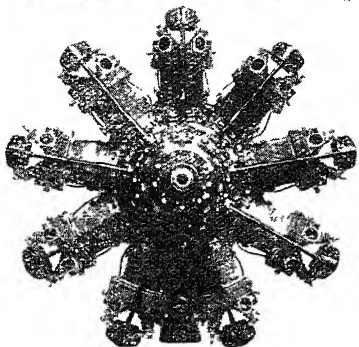
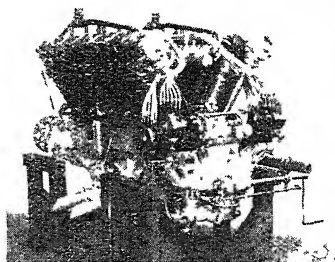
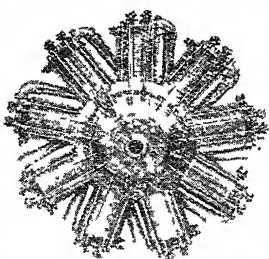
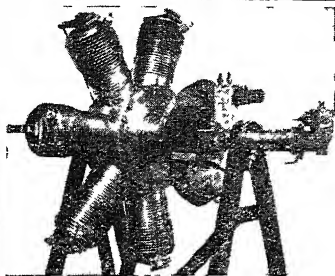
There were two 14-cylinder double-row rotary engines, the 120 h.p. Le Rhône, and the 140 h.p. Monosoupape; the second engine weighed 2.46 lb./h.p.

British Designs

The 160 h.p. Bentley 1 and the 240 h.p. Bentley 2 were the two British-designed rotary engines. The weight of the B.R.1. was 405 lb., giving it a weight/power ratio of 2.6 lb./h.p. The B.R.2 weighed 498 lb., with a ratio of 2.08 lb./h.p. The Bentley 2 marked the limit of development of the rotary engine, because of the heavy stress due to the rotation of the major part of the rotary engine's weight.

Rotary engines required frequent dismantling for overhaul. The permitted running time was: Le Rhône 30 hours, Gnome 40 hours, Clerget and Monosoupape 60 hours, and Bentley 90 hours. Even their great ease of removal from and refitting to aircraft could not compensate for the frequency of overhaul periods, and soon after the First Great War the rotary engine died out.

FIRST GREAT WAR DEVELOPMENTS. The water-cooled engine was enormously improved during the First Great War both in power and in weight to power ratio. The Hispano-Suiza V8-cylinder water-cooled engine weighed 490 lb. dry and developed 200 h.p. at 2,000 r.p.m. Other water-cooled engines developed during the First Great War were the Rolls-Royce 6-cylinder 100 h.p. Hawk; the 120 h.p. and 160 h.p. 6-cylinder Beardmore;

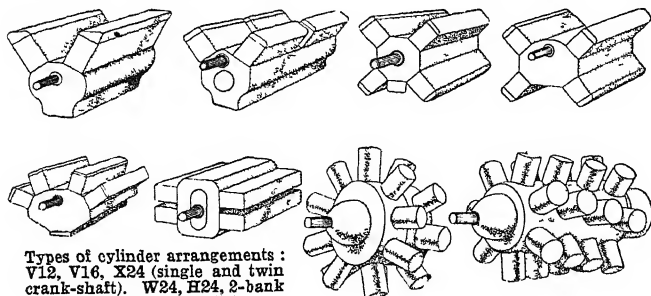


1. Avro Gnome, 50 h.p. 7-cyl. rotary, 1910. 2. Bentley B.R.2, 240 h.p. 9-cyl. rotary, 1914. 3. R.R. Eagle VIII, 360 h.p. 12-cyl. V; like the Bentley, it was in operational use in 1918. 4. Bristol Pegasus, developing 580 h.p. in 1930. 5. Rolls-Royce "R" engine, which

developed 2,300 h.p. and won Schneider trophy for Britain, 1931. 6. De Havilland Gipsy, 12-cyl. inverted V, 1938. 7. Wright Cyclone, 18-cyl., 1943. 8. R. R. Merlin (2-stage super-charger for high altitude flights). 9. Napier Sabre, 2,200 h.p. 24-cyl. H-type, 1943

AERO-ENGINES: THIRTY YEARS' PROGRESS WITH PISTON UNITS

1, Science Museum, 2, 3 and 6, from Sir Roy Fedden, "Aircraft Power Plant", 4, 5 and 7, "Flight", 9, D. Napier & Son, Ltd.



the 230 h.p. 6-cylinder B.H.P., later called the Siddeley Puma; the V12-cylinder Rolls-Royce 250 h.p. Falcon; and the 300 h.p. V8-cylinder Hispano-Suiza. The Rolls-Royce Eagle VIII water-cooled V12-cylinder engine developed 372 h.p. at 2,000 r.p.m. and weighed 947 lb. dry; its gross weight to power ratio was but 3.1 lb./h.p.; two of these engines powered the Vickers-Vimy aircraft that made the first non-stop transatlantic flight in 1919, and the first London-Australia flight later in the same year. The American Liberty V12-cylinder water-cooled engine developed 405 h.p. at 1,650 r.p.m. with a dry weight of 820 lb., giving a ratio of little more than 2 lb./h.p.

Air-cooled stationary engines were again temporarily eclipsed. The 70 h.p. and 80 h.p. V8-cylinder Renault engines, which were so successful in the early part of the First Great War, were replaced by the 100 h.p. Raf 1a V8-cylinder air-cooled engine and then the 140 h.p. Raf 4a V12-cylinder air-cooled engine; all were relatively heavy engines—5.65, 5.78, 4.61, and 4.85 lb./h.p. respectively.

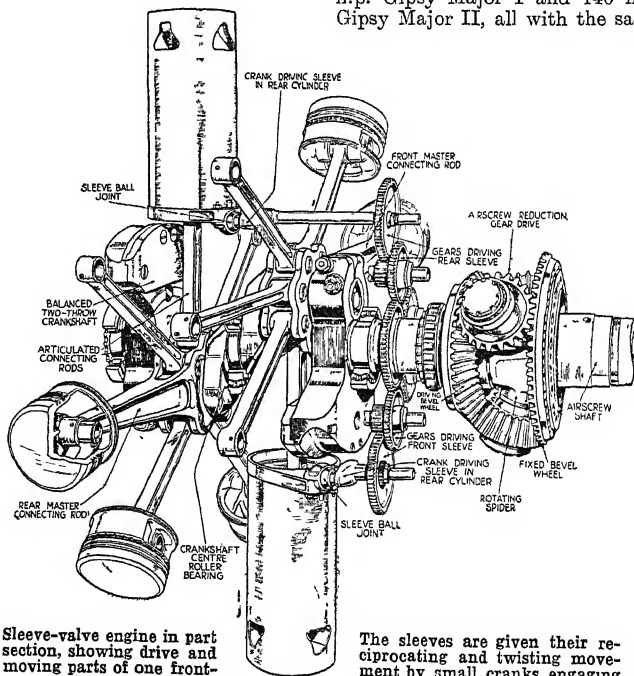
Succeeding them came the air-cooled radial engines, which, like the rotary engines, were first developed in France in the Gobron, Anzani, and Salmson engines. Among the earliest British radials were the A.B.C. 9-cylinder Dragonfly which developed 385 h.p. at 1,710 r.p.m. with a weight of 540 lb. This engine proved unreliable and was subject to mechanical failures. Contemporaneous with it was the Cosmos Mercury, a double-row 14-cylinder air-cooled radial, built, like the Dragonfly, to satisfy the British Air Board Scheme A issued in 1917. This Mercury developed 347 h.p. at 2,000 r.p.m. and weighed 582 lb. The later Cosmos Jupiter 9-cylinder air-cooled radial developed 450 h.p. at 1,800 r.p.m. and

weighed 562 lb. These engines brought the weight to power ratio below 1.5 lb./h.p.

THE INTERIM PERIOD. Aero-engine development after 1919 was for a long time slow, after the expenditure on research and production fell. By 1923 the Siddeley Jaguar 14-cylinder, two-row air-cooled radial engine developed 360 h.p. and weighed 710 lb.; its maximum running speed was 1,650 r.p.m. By 1925 the Jupiter (then a Bristol engine) developed 485 h.p. By 1930 horsepower had risen to about 600–800 h.p. for normal Service engines, although special racing engines had been built to put forth two to two-and-a-half times that power for short periods. Among the air-cooled radial engines then

were the 625 h.p. two-row 14-cylinder Armstrong Siddeley Panther (2,400 r.p.m.); the 750 h.p. 9-cylinder Bristol Pegasus (2,525 r.p.m.); the 800 h.p. two-row 14-cylinder Pratt & Whitney Twin Wasp (2,400 r.p.m.); and the 735 h.p. 9-cylinder Wright Cyclone (1,950 r.p.m.); their weights were 980; 1,000; 1,162; and 945 lb.

The production of the ultra-light aeroplane in 1923 brought motor-cycle engines into use for aircraft. Converted engines were the $2\frac{1}{4}$ h.p. A.B.C. and the $3\frac{1}{2}$ and 6 h.p. Douglas flat-twin, and the 5 h.p. Blackburn and J.A.P. V-twin engines. Then came the 20 h.p. Bristol Cherub flat-twin specially built for aircraft. These engines were succeeded by the 4-cylinder in-line air-cooled 70 h.p. Cirrus made by the Aircraft Disposal Co., Ltd., from parts taken from the 70 h.p. Renault engines left over from the First Great War; this powered the first Moth in 1925. The Cirrus Minor and Major engines made later by Blackburn Aircraft Ltd., developed 90 h.p. and 150 h.p. and were inverted 4-cylinder in-line air-cooled engines. De Havilland made their first Gipsy engine in 1927; the 1944 range included the 90 h.p. Gipsy Minor, the 130 h.p. Gipsy Major I and 140 h.p. Gipsy Major II, all with the same



Sleeve-valve engine in part section, showing drive and moving parts of one front-row and one back-row sleeve of the Bristol Hercules

The sleeves are given their reciprocating and twisting movement by small cranks engaging lugs on the sleeves

Courtesy of "Flight"

lay-out as the Cirrus. Four-cylinder De Havilland engines were followed by the 200 h.p. Gipsy Six, the 205 h.p. Gipsy Six II, and the V12-cylinder 525 h.p. Gipsy Twelve, four of which powered the D.H. Albatross airliner. All the later D.H. engines were inverted and air-cooled.

About the beginning of the Second Great War aero-engines in the lowest-powered class included the 33 h.p. Carden water-cooled 4-cylinder developed from the 10 h.p. Ford car engine; the 35 h.p. air-cooled V-twin Anzani made by Luton Aircraft Ltd.; and in the U.S.A. the 40 h.p. flat-four Continental, the 40 h.p. Aeronca flat-twin, and the 50 h.p. Menasco flat-four, all air-cooled. These five engines weighed 130 (dry), 110, 154, 121, and 164 lb., all showing a marked advance on the earliest Wright engines.

MODERN ENGINES. At the outbreak of the Second Great War the Bristol Pegasus (with the same capacity as the Jupiter of 1925) could produce 1,000 h.p. at 2,600 r.p.m. for a weight of 1,135 lb., while the newer 14-cylinder two-row Hercules radial gave 1,375 h.p. at 2,750 r.p.m. The 14-cylinder Twin Wasp R-1830 radial gave 1,200 h.p. at 2,700 r.p.m. for a weight of 1,420 lb. The Wright Cyclone-14 GR-2600 double-row radial gave 1,600 h.p. at 2,400 r.p.m. for a weight of 1,900 lb.

By 1943 the Hercules had been further developed to give 1,650 h.p.; Pratt and Whitney had a Double Wasp R-2800 18-cylinder two-row radial giving 1,850 h.p. at 2,600 r.p.m. for a weight of 2,280 lb.; and Wright had produced the Cyclone-18 GR-3350 giving 2,000 h.p. for a weight of 2,200 lb. These last two engines made possible the construction of aircraft like the Martin Mars 70-tons flying boat, and the Boeing B-29 Super Fortress bomber, which bombed Japan from China and Saipan.

During the first decade after the First Great War the Napier Lion was the most prominent British water-cooled engine. This 12-cylinder three-row broad arrow design developed 450 h.p. in 1920 and produced 700 h.p. about ten years later. As a racing engine the Lion VII-D was boosted to over 1,250 h.p. for the R.A.F. Schneider Trophy racing aircraft in 1927-29.

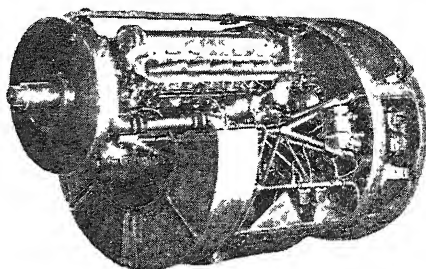
The Diesel or compression ignition aircraft engine has now been outclassed by the high efficiency petrol engine, but about midway between the wars Diesel

efficiency for long-range flight exceeded that of petrol engines. The subsequent introduction of 87, 90, and 100 octane fuels reversed the position. Bristol in the U.K. and Packard in the U.S.A. experimented with Diesel engines, but the only Diesel engine produced in quantity was the German Junkers Jumo 205 of 700 h.p. at 2,500 r.p.m. and 1,257 lb. weight. Napier had a

licence to build them in Britain. This German Diesel engine with six cylinders, twelve pistons, and two crank-shafts geared to a common air screw shaft, gave many maintenance problems in service. Nevertheless, the Diesel engine may some day be used for long range freight aircraft where optimum speed is not as important as economy of operation. It uses a heavier fuel than the petrol engine, with a lower fuel fire-risk, and dispenses with spark plugs.

ROLLS-ROYCE SERIES. This modern series of liquid-cooled engines began with the F.11. No. 1 first flew in Aug., 1927, piloted by Capt. Norman Macmillan. That engine was the prototype of the Kestrel, and from the Kestrel were developed the Buzzard, Merlin, and Griffon. The Merlin engine won the Battle of Britain in 1940, proving its superiority over German engines used by the Luftwaffe in that most gruelling of tests.

The Kestrel engine was made in a large series, with slightly varying characteristics, but typical examples were the moderately super-



Aero-engines. The complete Rolls-Royce Merlin series 620 "power-egg," as installed in the Avro Tudor and other notable post-war aircraft

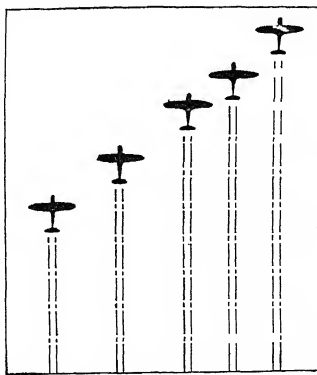
Photo, Rolls-Royce, Ltd

charged Marks VII, VIII, and IX which developed 680 h.p. at 2,900 r.p.m. for a weight of 975 lb. The Buzzard developed 955 h.p. at 2,300 r.p.m. for a weight of 1,540 lb. The 1929 Schneider Trophy "R" engine developed from the Buzzard gave 1,900 h.p. at 2,900 r.p.m. and the 1931 engine gave 2,300 h.p. at 3,200 r.p.m. for respective weights of 1,530 and 1,630 lb.

The 1939 Merlin II developed 1,030 h.p. for a weight of 1,335 lb. and the Merlin X gave 1,145 h.p. with a two-speed supercharger, both at 3,000 r.p.m. The later Merlin XX gave 1,260 h.p. for a weight of 1,450 lb. The Merlin LXI, provided with a two-stage (two-blower) supercharger, maintained ground level power to 40,000 feet, where the charge was compressed to six times atmospheric pressure.

A supercharger is an air blower or compressor built into the engine's induction system to raise the air pressure within the system and so force more air into each cylinder during its intake period. More fuel must be metered to balance the additional air. Greater power can be obtained from the higher gas pressure of a supercharged engine than from a non-supercharged engine of equal size. In practice supercharging is largely used (1) to increase power for taking off and (2) when flying at a height where power would normally fall owing to the lower density of the air. Superchargers are variously driven by gears from the engine shaft, by the exhaust gases (turbo-superchargers), and in the Daimler Benz turbo-supercharger engine by a fluid flywheel drive that compensates variations in air density as the aircraft changes height.

All the Rolls-Royce engines were V12-cylinder designs, liquid-cooled, not by water alone, but by a mixture of ethylene-glycol



Aero-engines. Increase in speed of climb, from take-off, of the Spitfire, resulting from Merlin engine development

From Fedden, "Aircraft Power Plant"

and water which has a greater temperature range between freezing and boiling points.

ENGINE DEVELOPMENT. In 1903 the Wright engine developed 3 h.p. per cylinder. In 1913 just over 18 h.p. per cylinder was considered good. In 1918 the Liberty engine gave 37.5 h.p. per cylinder. In 1923 the Jupiter gave 50 h.p. per cylinder. In 1939 the Pegasus gave 111 h.p. per cylinder. The early Griffon gave 146 h.p. per cylinder and before the end of 1944 produced 170 h.p. per cylinder. Penultimately the V12-cylinder engine (according to Sir Roy Fedden, 1944 Wilbur Wright Memorial Lecturer before the Royal Aeronautical Society) may produce about 2,400 h.p. or 200 h.p. per cylinder.

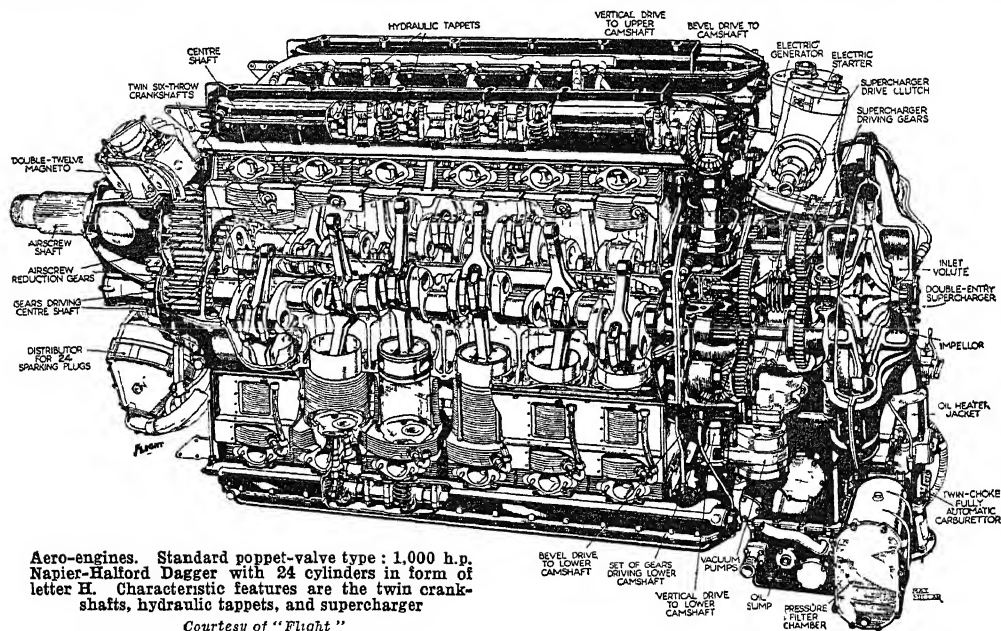
ments were soon discontinued, perhaps because of the urgency of war conditions.

Napier have for long been developing the "H" type engine, which began with the Rapier, a 16-cylinder air-cooled engine with eight upright and eight inverted cylinders each in two rows of four, and developing 305/385 h.p. at 3,500/3,900 r.p.m. for a weight of 720 lb. Next came the Dagger, with 24 cylinders similarly disposed in rows of six, and weighing 1,280 lb. with a power output of 630/705 h.p. at 3,500/4,000 r.p.m. The Mark VIII Dagger was developed to give 925/955 h.p. at 4,000/4,200 r.p.m. for a weight of 1,390 lb. The Dagger was air-cooled. Then came the 2,200-2,400 h.p. Sabre 24-cylinder "H" engine, with horizontal instead of

put it is thought that the piston engine will not be able to compete with the gas turbine. It is also regarded as possible that the limit of airscrew conversion of power may be reached with units of about 10,000 h.p.

Gas Turbines and Jet Propulsion Units

The gas turbine as a prime mover has long been sought, but its employment in aircraft was achieved only after the beginning of the Second Great War. Four nations—Italy, Britain, U.S.A., and Germany—employed the gas turbine prior to 1945. The gas turbine principle is simple. A compressor is fed with air as the aircraft moves through the air. After compression the air passes into a combustion chamber into which fuel is metered, and there



Aero-engines. Standard poppet-valve type: 1,000 h.p. Napier-Halford Dagger with 24 cylinders in form of letter H. Characteristic features are the twin crankshafts, hydraulic tappets, and supercharger

Courtesy of "Flight"

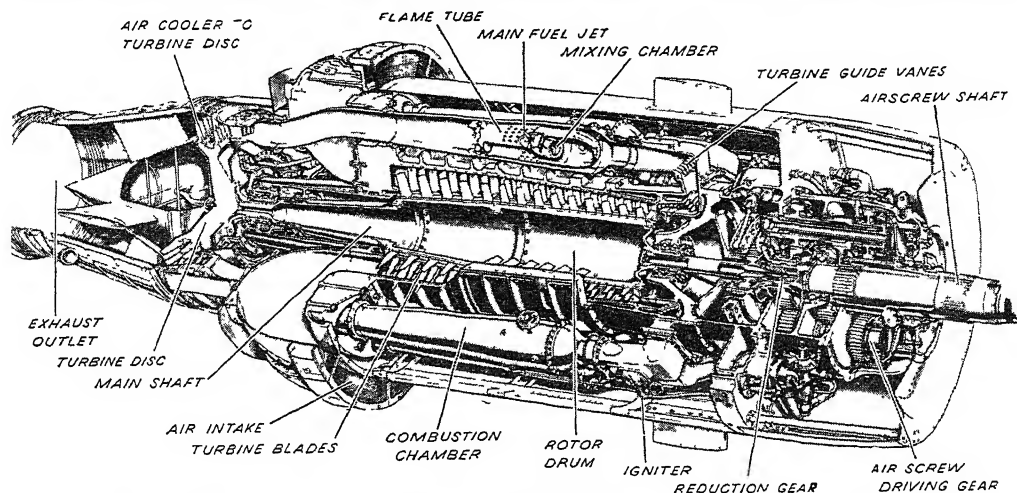
The two-row 18-cylinder radial engine can produce over 3,000 h.p., but when the penultimate power of this type of piston engine came in sight, with the demand for more power still growing, attention was given to other types of piston engines. Rolls-Royce developed the single-crankshaft 24-cylinder "X" engine which gave 1,845 h.p. at 3,000 r.p.m. The Allison Division of General Motors Corporation, biggest makers of liquid-cooled aircraft engines in U.S.A., produced a 2,200 h.p. 24-cylinder double-crank-shaft double-V engine. But, in both cases, the initial experi-

vertical cylinders, and liquid-cooled, with sleeve valves instead of the poppet valves used in the earlier engines. Rolls-Royce also produced a similar "H" engine—the experimental Eagle—with a nominal output of 3,500 h.p.

"H" engine development may produce engines of up to 6,000 h.p. Pratt and Whitney's Wasp Major, a 25-cylinder four-row radial unit developing up to 3,500 h.p., was in wide use by 1949; but 42-cylinder six-row radials producing about 8,000 h.p. are regarded as the final power development of piston petrol engines. Beyond that power out-

the mixture is fired, at first by a sparking plug and subsequently by spontaneous combustion due to the non-dissipated heat. The burning gas, under increased pressure, passes rearward and drives a turbine. The turbine is coupled to the compressor by a shaft and provides the power for the compressor. After flowing through the turbine, the gas, still at high pressure, is emitted through a suitably ducted passage and orificed jet. To start the engine an electric motor drives the compressor to feed air into the combustion chamber.

With high speed vehicles, such as aircraft, propulsion can be pro-



Aero-engines. The Armstrong Siddeley Python, an airscrew turbine (prop-jet) type in the highest power class
 "Flight" copyright drawing

vided by the reaction of the jet. But jet propulsion efficiency equals and exceeds the normal airscrew only at high speeds and altitudes. At 20,000 feet the optimum propulsive efficiency of the propeller is reached at 300 m.p.h. Above that speed jet efficiency improves, equalling the propeller at 540 m.p.h. and surpassing it at higher speeds. At 30,000 feet the jet equals the propeller at 450 m.p.h. These figures indicate that in the widest field of aviation the two methods of propulsion are complementary, with each having its most efficient speed range. This is further borne out by the comparison of fuel consumption. Compared with the piston engine operating at its most efficient fuel economy, the cruising consumption of fuel for gas turbine jet propulsion is from two to three times greater; this should not, however, be considered final, and better consumption should be realized as development continues.

Other developments of the gas turbine have combined the properties of airscrew and jet propulsion by making the turbine drive not only the compressor but also an airscrew. In this case the power developed by the prime mover is apportioned in the ratio of about

75 p.c. to the airscrew and about 25 p.c. to the jet.

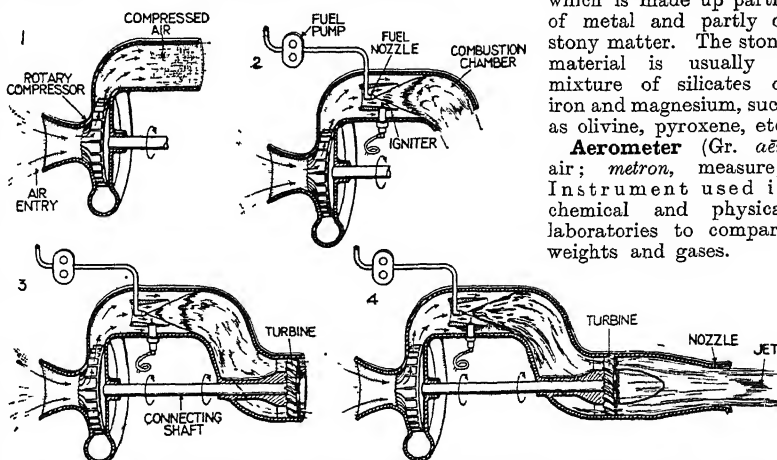
The advantages of gas turbines over piston engines may be summarised as lighter weight to power ratios, fewer and less complicated moving parts, more compact design rendering mounting within the wing a simpler process, more even torque reducing vibration to the minimum and making the unit suitable for shaft drive to remote airscrews, greater power per unit, and the use of cheaper fuels having a lower crash-fire risk than high octane petrols.

Aerofoil. The mainplanes, tailplane, elevator, fin, and rudder

of an aircraft are classified technically as aerofoils. Constructed to follow the streamline principle, they are shaped so that the effects of the airflow known as lift and drag can be utilised to keep the machine in the air and control it. The various sections of wings, which number hundreds, are termed aerofoils and in aeronautical engineering are known by names and numbers. See Aeronautics; Aeroplane.

Aerolite. Meteorite consisting entirely of stony material. It is in contradistinction to siderite, which consists only of metal, iron, and to siderolite, which is made up partly of metal and partly of stony matter. The stony material is usually a mixture of silicates of iron and magnesium, such as olivine, pyroxene, etc.

Aerometer (Gr. *aēr*, air; *metron*, measure). Instrument used in chemical and physical laboratories to compare weights and gases.



Aero-engines. Jet propulsion working cycle. 1. Shaft rotated by starting motor; air is drawn in and compressed by rotary compressor into combustion chamber. 2. Fine jet of fuel sprayed into compressed air; mixture, ignited by electric glow plug, burns continuously. 3. Mixture of heated combustion gases and air thrusts at high velocity through turbine, causing it to rotate and drive compressor; igniter plug is now switched off and operation continues so long as fuel is injected. 4. Stream of gas and air leaves turbine and issues from propulsion nozzle at high velocity

AERONAUTICS: MAN'S MASTERY OF FLIGHT

C. G. GREY, First Editor of The Aeroplane

In the following contribution the whole progress of aerial navigation from its inception is carefully outlined. The varied branches of the subject are all adequately dealt with under their respective headings and reference should be made therefore to Aeroplane; Air Fighting; Airship; Air Transport; Aviation, Civil; Balloon; Flight, and individual aircraft

The word aeronautics includes, as its etymology implies, everything concerned with the navigation of the air, such as, for example, the study and charting of the atmosphere, the science and practice of navigating aircraft, the construction of lighter-than-air and heavier-than-air craft and all their component parts and accessories. In its more limited sense aeronautics pertains to the practice of aerial navigation; that is to say, travel in the air by all forms of aircraft.

The first vehicles to navigate the air were balloons. Setting aside the suggestion of Leonardo da Vinci that an aerial vehicle could be made by exhausting the air from a metal globe, we find a

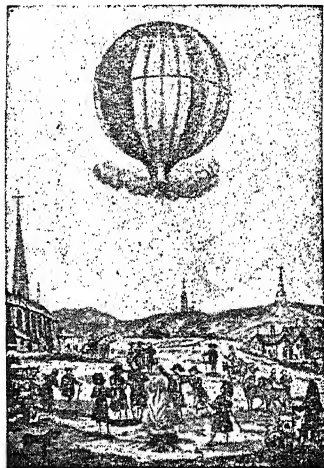
Some years later Tiberius Cavallo also found that bladders were too heavy and that paper would not hold hydrogen, but in 1782 he inflated soap bubbles with hydrogen and discovered that they would float upwards until they burst.

Meantime the brothers Stephen and Joseph Montgolfier had discovered that by inflating a paper bag with hot air it would rise; they argued, therefore, that if a paper bag could be filled with a cloud-like substance, namely smoke, it also would float. On this hypothesis they experimented with paper bags up to 700 cubic feet capacity, under which they lighted fires of chopped straw. Although they obtained immediate successes, it is of interest to note that it was some time before the brothers realized that the real lift was given not by the smoke but by the fact that the hot air inside the bags was lighter than the atmospheric air outside. Encouraged by their success, the Montgolfiers built a spherical paper balloon 30 feet in diameter with a capacity of 1,300 cubic feet, which was sent up June 5, 1783, without a passenger.

Almost coincidentally with this, M. de Saint Fond, a naturalist, and M. Charles, a professor of natural philosophy, and two brothers named Robert produced a hydrogen balloon, and this was sent up Aug. 27, 1783, from the Champ de Mars in Paris. This balloon was 13 feet in diameter,

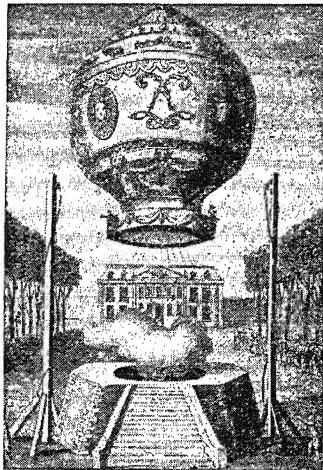
weighed under 20 lb., and was made of thin silk coated with rubber. Thus we find the two types of balloons—the hot air and the hydrogen—being developed side by side, just as different types of airships were developed coincidentally, and as the different types of aeroplanes developed together.

The distinction of being the first balloonists to take the air belonged to a sheep, a cock, and a duck, which were sent up in a Montgolfier balloon from Versailles Sept. 19, 1783. The balloon descended eight minutes after the start as the air inside it cooled, and the sheep and the duck were found to be uninjured. The cock was found to be very unwell, and its condition was

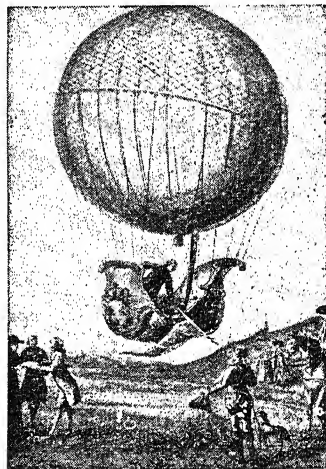


Montgolfiers' first hot-air balloon, June 5, 1783. It carried no passenger

French missionary writing in 1694 that a balloon was sent up in celebration of the coronation of the emperor Fo-Kien at Peking in 1306. This was mentioned more as an established custom than as a first attempt, and it is possible that the Chinese, with their intimate knowledge of kites and of other scientific instruments concerned with the atmosphere, did actually know how to make a hot-air balloon in those days. In 1766 Cavendish published his estimate of the weight of hydrogen, and immediately afterwards Dr. Black, of Edinburgh, made a skin balloon, which, however, was too heavy to be lifted by the hydrogen which it could hold.



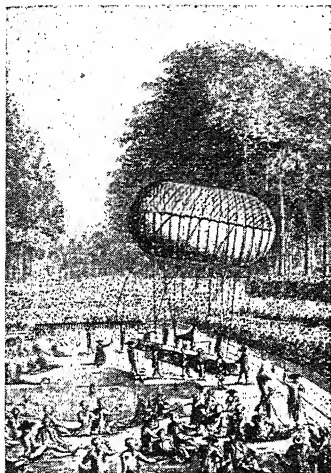
First ascent with two passengers in a free hot-air balloon, Nov. 21, 1783



Earliest flight in a hydrogen-filled balloon from Paris to Nesle, Dec. 1, 1783

attributed by the learned professors present to the rarefied atmosphere above. Closer investigation, however, indicated that it had been trampled on by the sheep.

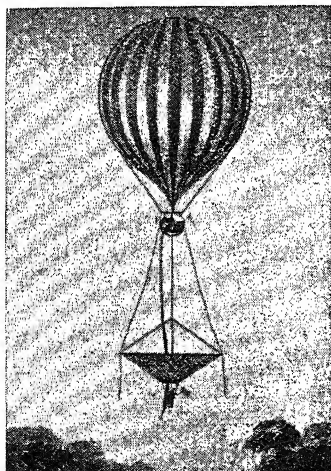
The first ascent of a man-carrying balloon was made by M. Pilâtre de Rozier, who went up in a Montgolfier balloon Oct. 15, 1783. The balloon was attached to a cord so that it could not rise higher than 100 feet, and it was kept at that height for nearly five minutes by the continuous heating of the air inside by means of a fire of chopped straw carried in a brazier under the neck of the balloon. On Nov. 21, 1783, M. de Rozier with the Marquis d'Arlandes



Earliest ascent in a balloon with steering apparatus, at St. Cloud, July, 1784

made the first free balloon ascent. They started from Paris and descended safely in a field five miles away after drifting for 20 minutes at not more than 500 feet.

From this date the actual beginning of aeronautics in the strict sense of aerial navigation may be reckoned. Only seven days later, Nov. 28, a carpenter named James Wilcox ascended at Philadelphia in a car attached to 47 small balloons filled with hydrogen, and made by two Philadelphian scientists, Hopkins and Rittenhouse, so that to him belongs the honour of being the first to ascend by means of hydrogen. The first European ascent in a hydrogen balloon was made Dec. 1, 1783, by Messrs. Charles and Robert, who made a trip of 27 miles from Paris to Nesle in two hours, reaching a height of 2,000 feet.



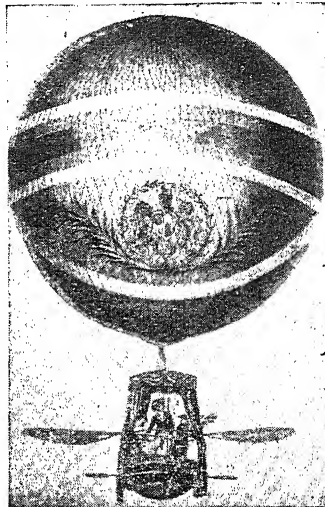
Balloon and parachute ascent from Vauxhall, July 24, 1837

The natural sequence from the free balloon was the idea of making a navigable balloon. Various attempts were made to propel ordinary spherical balloons by means of oars worked by hand from the car, and even by large propellers made of fabric stretched on frames and turned by a crank from the inside of the car. With these vehicles a certain very limited success was attained; that is to say, they could be propelled over the ground if the air were absolutely calm. From these, very naturally, followed the idea of making a cigar-shaped balloon which would move more easily through the air, and in 1870 a French experimenter, M. Dupuy de Lôme, made a cigar-shaped balloon 29½ feet in diameter which was driven by a two-bladed propeller 11 feet in diameter, which was turned by the united efforts of eight passengers. In this way a speed of a few miles per hour was obtained.

Before this Henri Giffard built in 1852 a spindle-shaped balloon 144 feet long, which was driven by a propeller worked by a 3-h.p. steam engine. This machine made a speed of seven miles an hour. There was a big gap from this until 1882, when the brothers Tissandier built a spindle-shaped balloon driven by an electric motor worked by a bichromate-of-potash battery. This was actually an approach in its general ideas to the modern airship. The next step was taken by Captain Charles Renard, who, in 1884, built another electrically driven airship. The envelope was of a true "streamline" form, being of circular section with tapering ends, its greatest diameter being about one-third of the length from the front. The envelope had a capacity of 66,000 cubic feet.

Meantime the Germans had been investigating on their own account, and in 1879 Herren Baumgarten and Wolfert built the first airship with a petrol motor of Daimler's make. This was smashed in the experimental stage, and after many experiments Wolfert built another airship in 1897 on somewhat similar lines. This machine left the ground, but the gas caught fire and Wolfert and his assistant were killed.

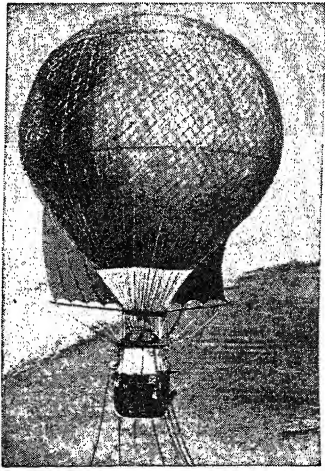
The next steps in the development of airships were made by Santos-Dumont, who constructed numerous small airships between 1898 and 1906, and from his early experiments developed the various non-rigid airships of today. The first rigid airship from which the Zeppelin and the big British types have developed was built in 1897



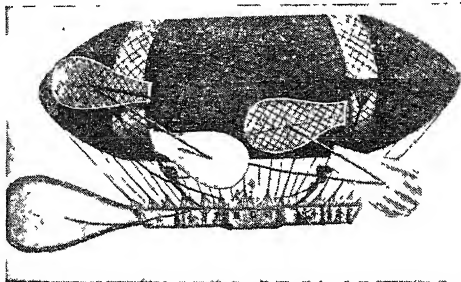
Lunardi's ascent from St. George's Fields, London, June 29, 1785

by an Austrian engineer named Schwartz. This was made of sheet aluminium over a metal framework. It is believed to have left the ground, but it was not a success. Nevertheless, it was the direct ancestor of the Zeppelin.

It must be understood that balloons and airships operate on the principle that their envelopes are filled with gas which is lighter than the surrounding air, and they therefore float in practically the same way that a boat does in the water, or perhaps one should rather say as a submarine floats, in that they are entirely surrounded by the air and do not float on the surface. Apart from the Montgolfier-type balloons, which operate on the principle that hot air is lighter than cold air,



Departure of Andrée's balloon from Spitzbergen for the North Pole in 1897



First attempt at a man-power airship, made in England in 1834. It was to be propelled by wings

all balloons are filled either with hydrogen or with coal gas. Coal gas being heavier than hydrogen, airships invariably used hydrogen until the year 1919, and therefore all airships and balloons have been peculiarly liable to destruction by fire because both hydrogen and coal gas are highly inflammable.

It had long been known that helium gas, which is a trifle heavier than hydrogen but a great deal lighter than coal gas, is non-inflammable, but until 1918 it was impossible to produce helium in sufficient quantities to use it for the inflation of airships. In that year it was discovered that certain of the natural gas springs in America contained helium in large quantities, and forthwith preparations were made to secure this helium on a commercial basis for use in airships. On the successes of these efforts, the success of the airship as a passenger vehicle very largely depends.

We may turn now to the question of heavier-than-air craft. As everybody knows, it has been the ambition of man from the earliest legendary periods to fly as a bird flies, and the heavier-than-air flying machine is the direct outcome of that desire. Strictly speaking, the heavier-than-air craft is the only true flying machine, as the lighter-than-air craft floats and does not fly. In all ages attempts have been made to fly with wings,

but without real success until the 19th century.

Very many models were made to fly by means of small steam engines, small petrol engines, and twisted elastic, long before a man-carrying flier was produced. The first steps towards the production of the flying machine

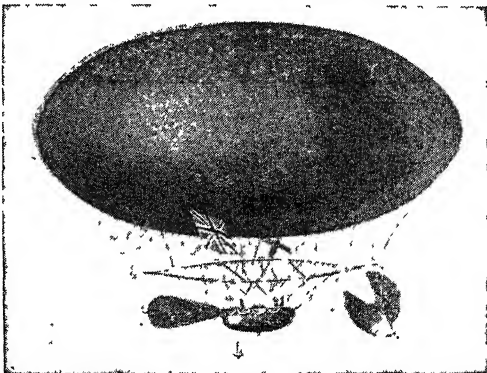
were a variety of types of machine with flapping wings intended to be operated by the physical strength of the pilot. None of these achieved any success whatever. The first successful efforts took the form of gliders, which may be best described as aeroplanes more or less on modern lines but without

engines. These gliders were launched as a rule from the top of a hill in the face of a wind, and might be described as free kites. Probably the first successes in this direction were achieved by Sir George Cayley, an English squire, somewhere about the year 1809.

The next successful experiments were made by Prof. Otto Lilienthal, who began experimenting in 1871 and achieved a number of glides of considerable length between 1891 and his death—owing to the collapse of one of his gliders at a height of 50 feet—on Aug. 10, 1896. Among others who made successful gliding experiments were Prof. Chanute, Prof. Langley, Dr. Montgomery, and the brothers Wright in America; Messrs Pilcher, Wenham, Dunne, and Weiss in England; and Messrs. Ader, Blériot, Pénaud, Santos-Dumont, the Voisin brothers, and the Farman brothers in France.

It is claimed that the first power-driven aeroplane to leave the ground was

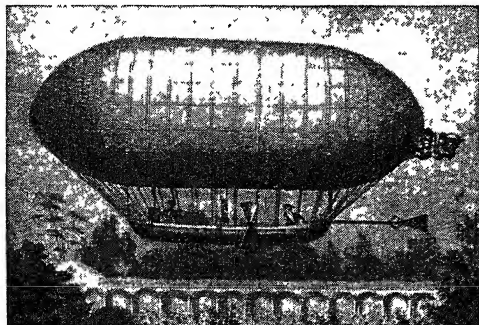
one built by Clément Ader, which was said to have left the ground on Oct. 9, 1890, but close investigation tends to show that only one wheel of the machine left the ground and that the other was still touching. On the other hand, there is no doubt whatever that an actual controlled flight by a man-carrying power-driven aeroplane was made by Orville Wright at Dayton, Ohio, U.S.A., on Dec. 17, 1903. This stands as the first authentic flight in history. That flight was a straight trip of 852 feet, which was a good deal shorter than some of the glides which had been made previously. Progress was slow from that date until 1908, when a number of experimenters produced flying machines which really flew, and brought into being the aeroplane as we know it today. The first hops from the ground with a power-driven ma-



Model of Monek Mason's aerial machine, 1843, which was propelled by a section of an Archimedeian screw

chine in Europe were made by Santos-Dumont—already well known as an airship experimenter—on Aug. 22, 1906, and on Sept. 12, 1906, a machine built by a Dane named Ellehammer also left the ground under its own power, but on Oct. 23 Santos-Dumont achieved a flight of 200 feet which was clearly not a hop, and so achieved the distinction of being the first person to fly in Europe.

The year in which flying actually began to develop was 1908, for in that year the Blériot monoplanes and the Antoinette monoplanes and the Voisin biplanes flew regularly in France. A. V. Roe and the late S. F. Cody made their first short flights in England. Glenn Curtiss and J. A. D. McCurdy flew the Curtiss machines in America, and the late Wilbur Wright brought an improved Wright biplane to Europe and demonstrated in France the real possibilities of aeroplanes. Prior to the arrival of Wright, the longest flight in



Ascent of Bell's steerable balloon at Vauxhall, July 22, 1850. It was fitted with man-power side propellers

Europe had been one of 12 miles made in 1908 by Henry Farman on a Voisin biplane, but on Sept. 21 Wilbur Wright flew his machine for 60 miles and remained in the air for an hour and a half.

The real starting-point of aerial navigation was 1909, for in that year exhibition meetings took place all over Europe and America and many cross-country flights were made. On July 13 Blériot made the first place-to-place flight from Étampes to Toury and Cheville—a distance of 33 miles—and on July 25 he flew the English Channel from Calais to Dover. On Aug. 27 of that year, at the famous Reims meeting, Henry Farman, on a biplane of his own construction, fitted with the now famous Gnome engine, covered a distance of 118 miles in 3 hours and 5 minutes without alighting, this being the first occasion on which a hundred miles had been covered in the air and on which an aeroplane had remained in the air for three hours. At that period the maximum speed of aeroplanes was under 50 m.p.h., the greatest height known to have been reached by an aeroplane was 500 ft., and not more than two persons had been lifted at once in one aeroplane.

PROGRESS OF AERONAUTICS. Few products of mechanical science and ingenuity have made so much progress as the aeroplane in the 21 years between the armistice in Nov., 1918, and the outbreak of war in Sept., 1939. In 1918 the fastest aeroplanes had a speed of 160 m.p.h. In 1939 the fastest military aircraft could reach about 370 m.p.h. By 1949 that had gone up to 670 m.p.h.

In 1918 a flight of 500 miles non-stop was quite an achievement, but in 1919 John Alcock and Arthur Whitten Brown flew across the Atlantic, some 2,000 miles non-stop from Newfoundland to Ireland. By the end of 1944 more than 20,000 aeroplanes had flown the Atlantic—most of them from west to east, as weapons of war. After the Second Great War transatlantic flying became a routine commercial operation, and direct flights between New York and London and between similar national capitals appeared in the daily time-tables.

At the end of the First Great War most aircraft were biplanes, built as a girder structure of struts and stays, mostly of wood covered with fabric and braced with wire. Prof. Junkers designed and built in 1917 a cantilever monoplane (one in

which the wings were designed to carry their loads without external bracing) all in aluminium, except the engine and certain key points in the structure. The aluminium sheets covering the wings were corrugated from leading edge to trailing edge to resist wing torsion. But for years afterwards most of the world's air liners were still strut-and-wire biplanes. There were, however, notable exceptions in the Junkers, Dornier, and Fokker designs. Although all manufacturing nations prided themselves on having developed highly the science of aerodynamics, their aircraft, up to about the year 1930, showed little knowledge of such a simple thing as "streamlining," a word which means something to everybody today.

After 1930 any aircraft with pretensions to high speed retracted its wheels (or undercarriage) into its body, its wings or engine housings after it left the ground. Most had auxiliary flaps on the wings which were pulled down by hydraulic mechanism (as were the undercarriages) when landing to steepen the gliding angle but also to slow the speed, and to give added lift when taking off.

The performances of modern aircraft are due to increased engine-power. The utmost engine-power of 1918 was 450 h.p. By 1945 1,000 h.p. had become a fair average, and 2,000 h.p. was a high power, but there were engines of 3,000 h.p. flying in 1945. The standard of reliability was very high, with few engine failures on long non-stop journeys across the Atlantic and Indian Oceans, and the deserts of Africa and Asia. (See Aero-Engines.)

The chief effort of the designers of aircraft and engines was devoted to improving weapons of destruction during the years after 1930. Consequently the Second Great War left the world still short of the best possible developments in air passenger transport.

By 1949, however, the U.S. industry had produced the Boeing Stratocruiser, Lockheed Constellation, and Douglas DC-6, all outstanding commercial designs capable of carrying 40-60 passengers over long ranges. The 120-ton Bristol Brabazon made its first flights in the U.K. the same year, as did the 500-m.p.h. D.H. Comet jet air-liner.

Good progress was also made in big seagoing aircraft. The old wooden biplane twin-engined flying boats of 1918, F.3 and F.5, were before 1939 surpassed by the

handsome all-metal monoplane Empire flying-boats, which were built for Imperial Airways, Ltd., by Short Brothers of Rochester, the pioneers of seaplanes. They had four engines of about 900 h.p. each, a maximum speed of 200 m.p.h., and a cruising speed of about 160 m.p.h. Their regular voyage from England to Sydney (Australia) was for years the longest scheduled air-route in the world. Marine aircraft later suffered something of an eclipse owing to their comparatively slow speed and the cost of installing suitable bases. Saunders-Roe, however, were awarded a contract to build three 10-engined flying boats comparable in size to the Brabazon (the Princess class).

THE SCIENCE OF AERONAUTICS. An enormous field is covered by this subject which has grown naturally out of many older sciences, by applying them to the air and adding to them knowledge gained from the action or reaction of the air. The Royal Aeronautical Society, founded in 1866, is the oldest organization in the world which is, and has been, concerned with the science of the air. The branch of general science which is the basis of all aeronautical science is dynamics. Hence the science of aerodynamics (*q.v.*) deals with the action of the air on all forms of aircraft, from children's kites to the fastest aeroplanes or the biggest airships.

Between the First and Second Great Wars eminent aerodynamic scientists discussed the highest speed which an aeroplane could reach, according to calculations and experiments based on existing knowledge at that time. But after war began the highest calculated performances were surpassed in more or less regular steps. Likewise calculations for range without alighting, for load carried with wings of a certain size and with engines of a certain power, and for height reached with given power and load, were constantly being passed. Another important branch of aeronautical science is the calculation of the stresses and strains put upon the parts of aircraft—wings, tails, fins, rudders, ailerons, and even such things as windows or panels in the body, or the mechanisms which work the controls. If aerodynamics can provide the knowledge of the pressure of the air, then the calculations of the sizes of the mechanisms and the materials which the designer may safely use is a branch of mechanical

or structural engineering like building a bridge or a house

Air navigation, which is what the word aeronautics means is a branch or rather a growth out of sea navigation, complicated by the very high speeds of aircraft compared with seagoing ships, and simplified by new scientific instruments, which have been developed for aircraft but could be (and in some instances are) used by seacraft. Meteorology has been so highly developed since 1914 that it might fairly be claimed as a department of aeronautical science. Jet propulsion and rocket propulsion are, for practical purposes of either destruction or transportation the products of aerodynamics as well as of ballistics and chemical science and metallurgy.

AEROPLANE: HOW IT HAS DEVELOPED

Capt Norman Macmillan M.C., A.F.C.

This article tells in detail the story of the origin of heavier than air machines and their development in size, stability and power through half a century. See also Jet Propulsion, Rocket Propulsion

The word aeroplane was not standardised immediately: the motor propelled heavier than air flying machine was produced by Wilbur and Orville Wright, the brothers who first flew a power driven aeroplane called their machine a flyer. Dr Alexander Graham Bell in an address given before the Washington Academy of Sciences on Dec 13, 1906, used the then alternative name aerodrome which had been adopted by Professor S. P. Langley, the secretary of the Smithsonian Institution, U.S.A. But subsequently, aeroplane denoted the machine, and aerodrome the prepared surface area used by aircraft for starting and alighting. The Americans shortened the word aeroplane to airplane, aerodrome, they usually call airfield (or even field), the R.A.F. calls military aerodromes air stations, commercial transport aerodromes are frequently called airports. But the noun aeroplane/airplane is a standard word meaning a heavier than air flying machine with fixed wings usually to be found with all the prerequisites for starting, maintaining flight, and alighting contained within its own structure. Italians use almost the same word "aeroplano". French and Spanish speaking people use the word *avion*. Germans call the aeroplane *Flugzeug*.

The Wright "flyer" of 1903 was the first successful aeroplane (for a description of this aeroplane

Already there are chairs of aeronautics at universities where engineering degrees are conferred upon graduates. In Great Britain a government committee's recommendation was followed by the establishment of a College of Aeronautics on a permanent basis. In April, 1945, the Aeronautical Research Council was set up with Sir Melville Jones as chairman.

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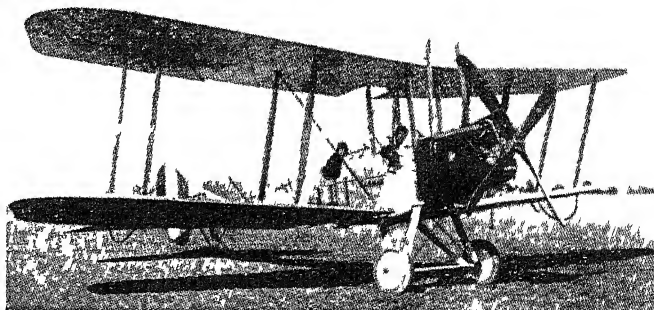
and its power unit, see Aero Engines). Their use of three axis air controls assured the Wrights success for these enabled them to balance their unstable craft. All other experimenters had attempted to fly with not more than two axis controls frequently a disastrous experiment with unstable aeroplanes. In 1904 the Wrights made 105 landings, some resulting in breakages. In Sept of that year in a new machine they made their first curved flights. They then made circular flights, the two longest of nearly three miles in five minutes, in these flights they carried iron bars as ballast, first of 50 lb and then of 70 lb weight.

In 1905, in their third aeroplane, they made 49 flights, seven

ended in breakages. By Sept they could make 10 mile flights succeeded by flights of 11, 12, 15, 21 and 24 miles. Then to keep their secrets they ceased to fly, dismantled the aeroplane and in 1906 made no flights while they negotiated with possible purchasers. While the Wrights were power flying Captain F. Ferber was experimenting in France with gliders, and in 1904 gave a lecture in Lyons on his work. Gabriel Voisin came on the platform dedicated his life to aviation and next day left for Paris where he founded the first aeroplane factory in France. Their earliest experiments were conducted with man carrying box kites towed on the Seine by fast motor boats. Blériot began his experiments with the Voisin brothers; he was also an enthusiastic pioneer cinematographer, and his cinematograph records of those early experiments are the best pictorial record of that period. The Voisins made biplanes. Blériot broke away from them and began to make monoplanes in 1908.

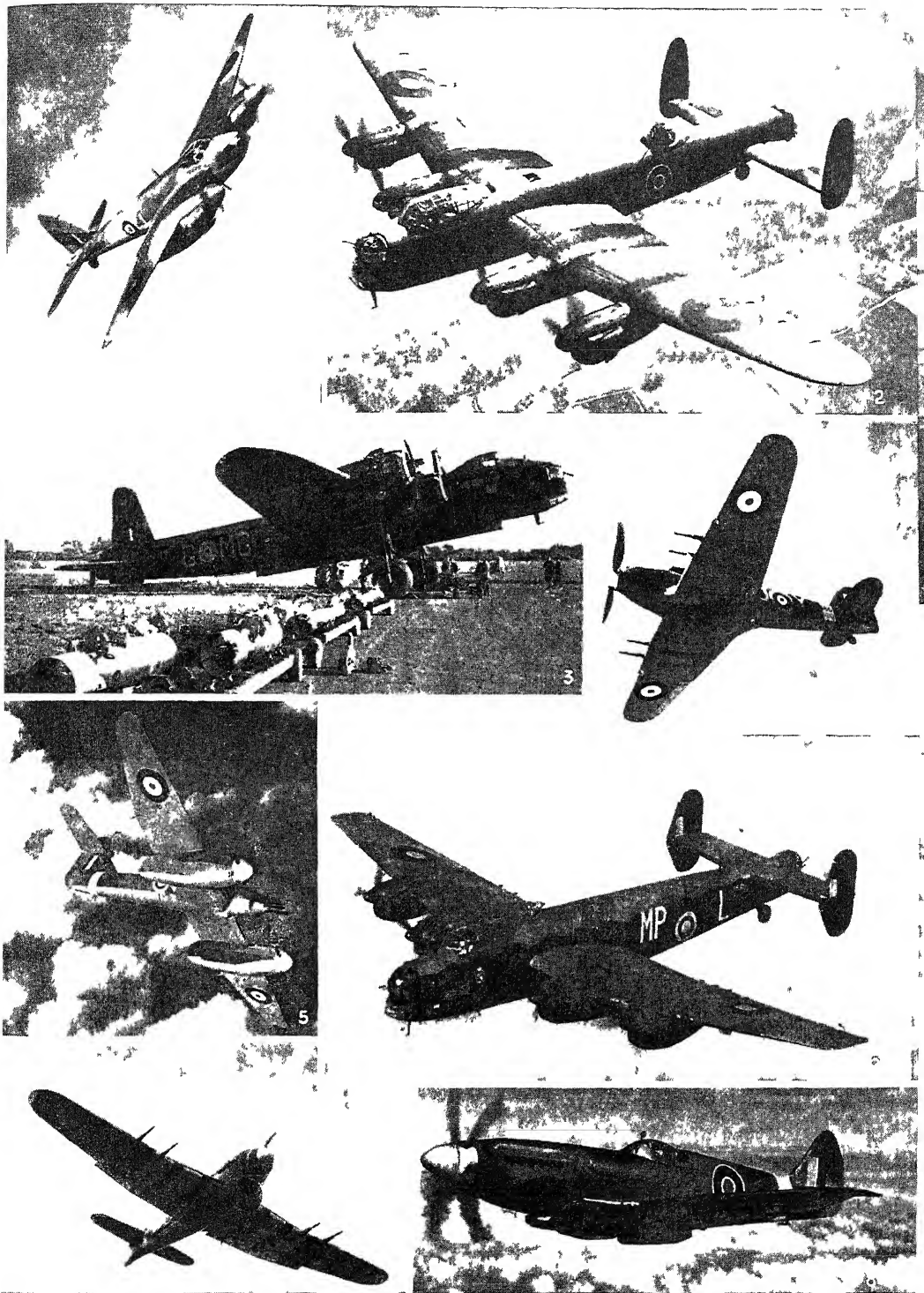
Meanwhile Ferber met Levavasseur the inventor of the Antoinette, a light V8 cylinder engine named after the daughter of M. Gastambide who supplied Levavasseur with funds for his experiments. Ferber joined the Antoinette company in 1906 and by 1908 was flying in an aeroplane of his own design; he was killed in Sept 1909 when landing on rough ground near Boulogne.

In 1908 Wilbur Wright visited France alone while Orville demonstrated their invention in America. The Wright machine had two control sticks. The left hand stick moved fore and aft to work the elevator. The right hand stick moved fore and aft to work the rudder and sideways to warp



Aeroplane An early fighter, the B.E.2c ill-equipped for air combat it became a frequent victim in France in 1915

Photo Imperial War Museum

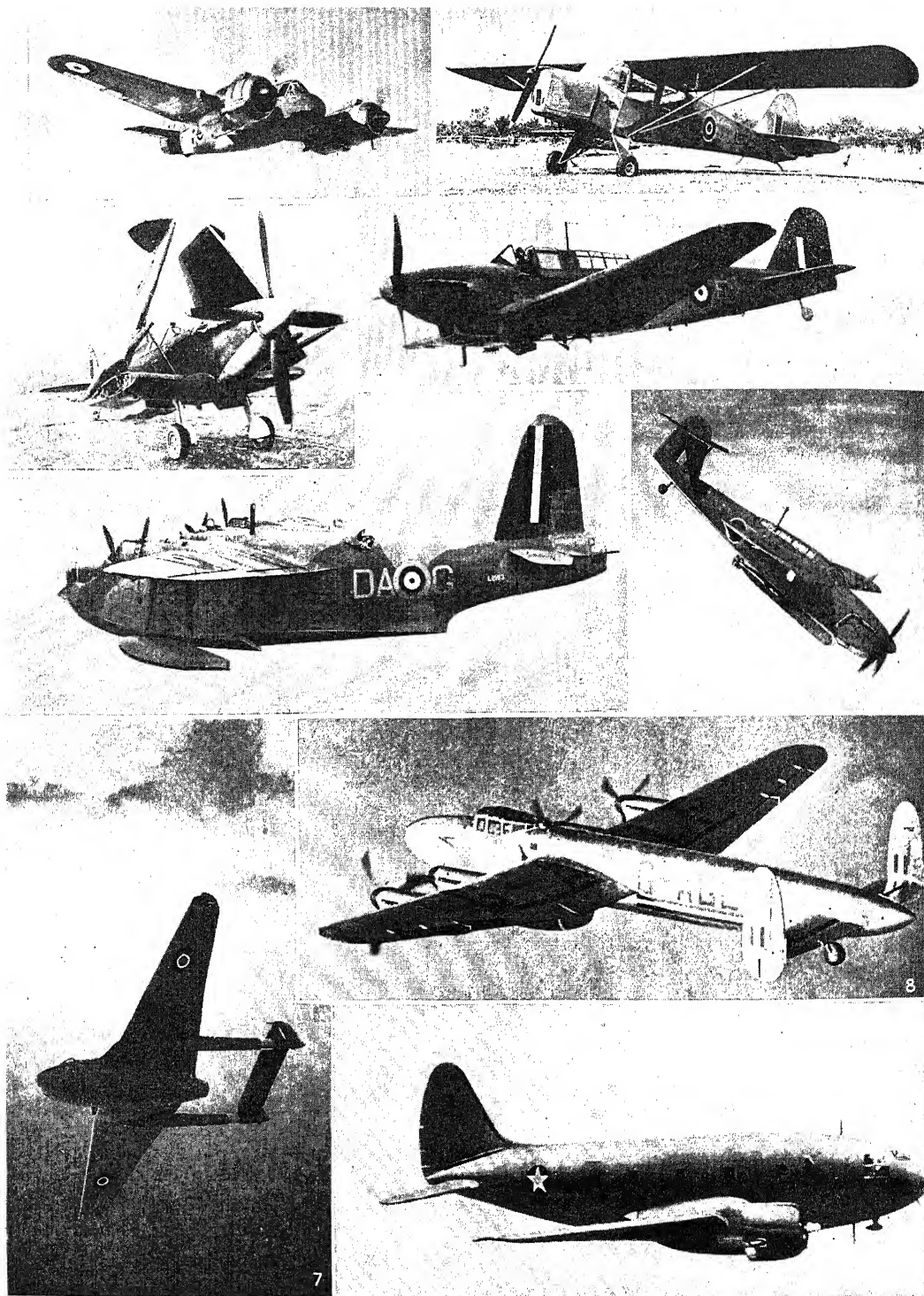


1 De Havilland Mosquito IV recon bomber 2 Avro Lancaster bomber note underslung engine nacelles 3 Bombing up a Short Stirling 4 Hawker Hurricane fighter which carries four 20 mm cannon 5 Westland Whirlwind day and night fighter 6 Handley Page Halifax

bomber with eight machine guns in nose and tail turrets 7 Hawker Typhoon high speed fighter with Napier Sabre engine and four cannon 8 Vickers Supermarine Spitfire XIV high altitude fighter equipped with a two speed two stage supercharged Rolls Royce Griffon engine

AEROPLANE FAMOUS BOMBERS AND FIGHTERS OF THE ROYAL AIR FORCE

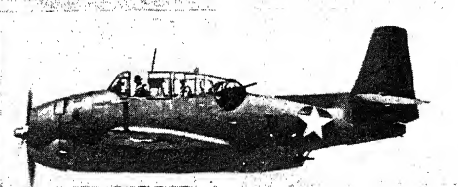
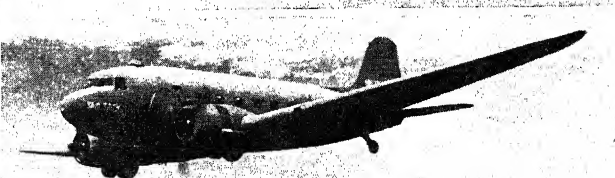
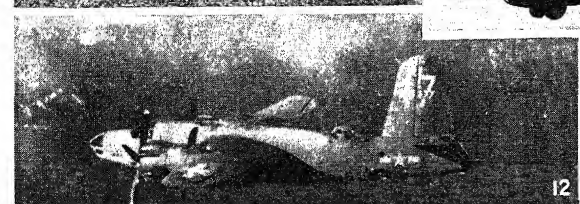
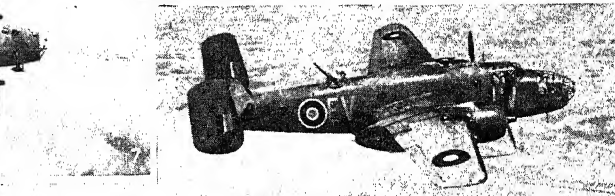
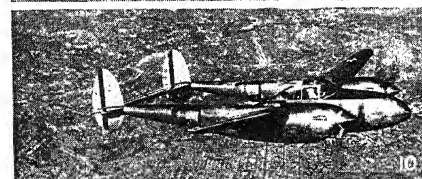
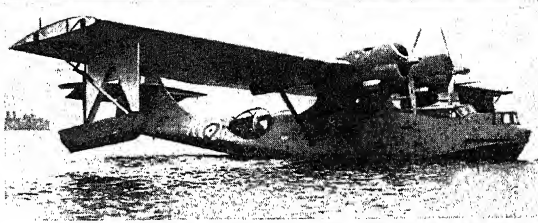
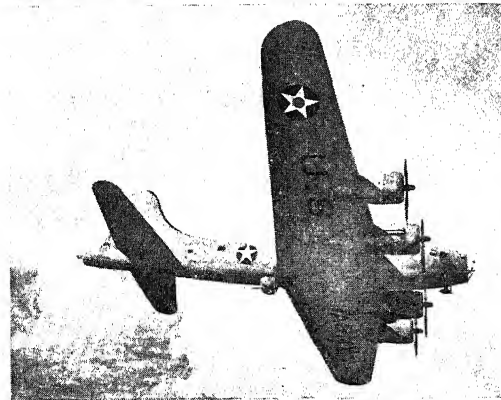
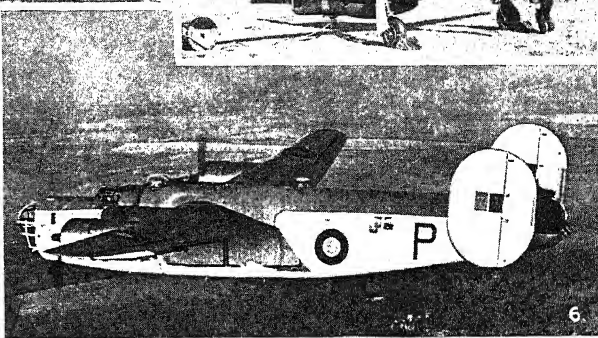
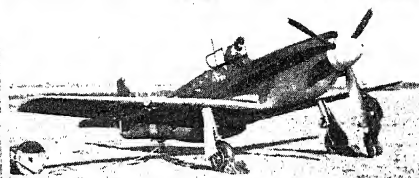
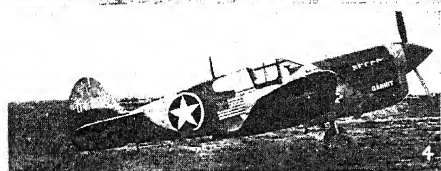
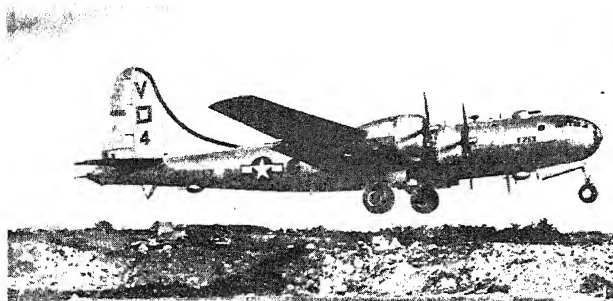
11/10/41 1 Charles L. Brier 2 Barratt 3 W. de W. 4 6 118 British Official 5 Flight 7 Associated Press



1. Bristol Beaufighter, which carries eight rocket projectiles.
 2. Taylorcraft Auster, for artillery spotting, ambulance work, etc. 3. Vickers-Armstrongs Seafire, with wings folded. 4. Fairey Fulmar, another carrier-borne fighter.
 5. Short Sunderland flying-boat, a recon bomber. 6. Fairey Barracuda, dive, precision, and torpedo bomber.
 7. De Havilland Vampire, jet-propelled interceptor fighter, top speed over 500 m.p.h. 8. Avro Lancaster, a transatlantic mail plane. 9. Curtiss-Wright Commando, used both as a civil transport and for carrying war supplies.

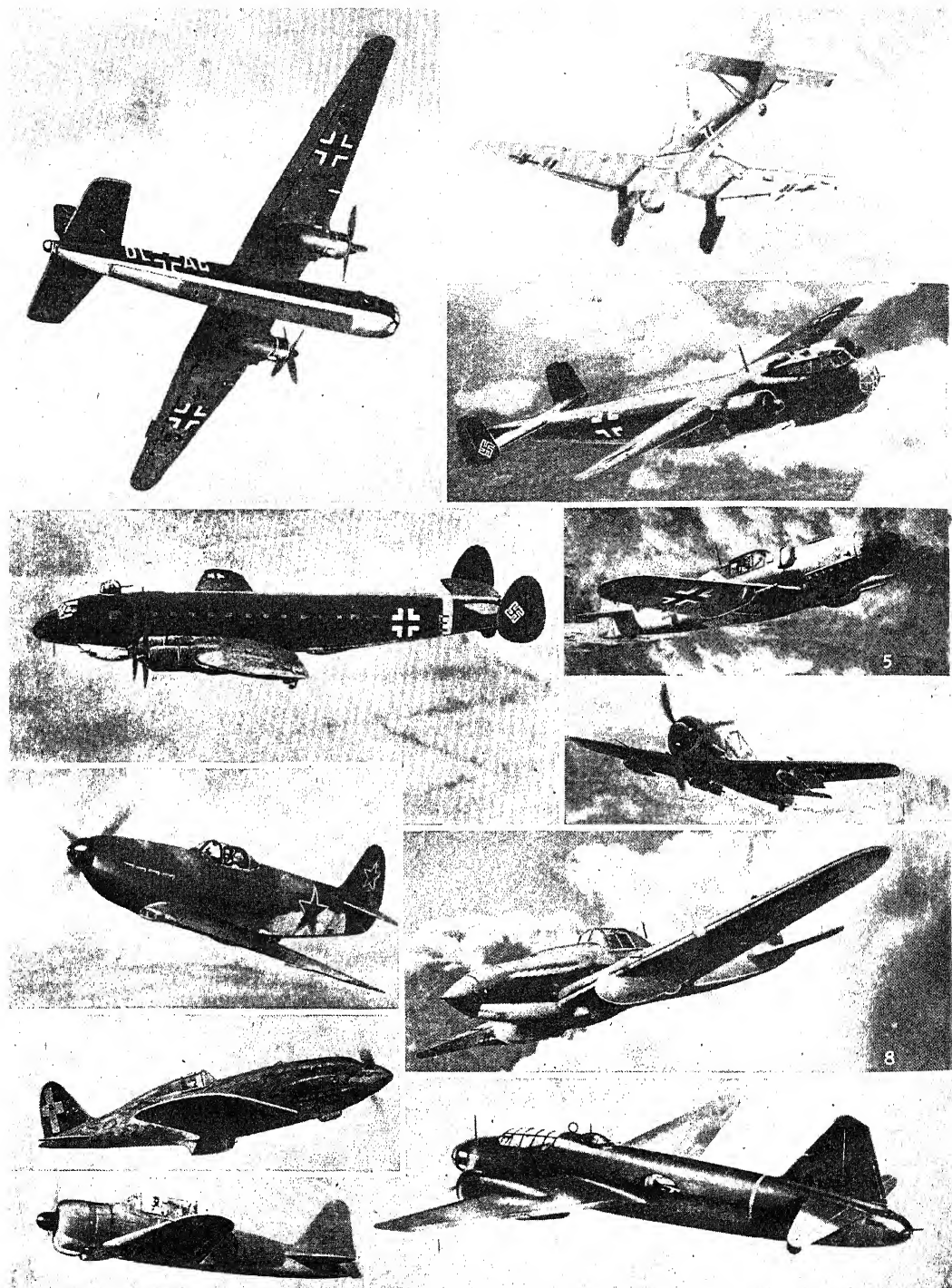
AEROPLANE: MORE BRITISH MILITARY AIRCRAFT AND SOME TRANSPORT MACHINES

Photos, 1, 2, 3, and 5, British Official; 4, Central Press; 6 and 7 Charles E. Brown; 8, Barratt's; 9, Associated Press



1. Boeing Superfortress, which carried a greater bomb load farther, faster, and higher than any other machine. 2. Douglas Havoc night fighter. 3. N. American Mustang fighter. 4. Curtiss Kittyhawk II fighter. 5. Grumman Wildcat carrier-borne fighter. 6. Consolidated Liberator heavy bomber. 7. Boeing Flying Fortress bomber. 8. Consolidated Catalina flying-boat, bomber. 9. N. American Mitchell bomber. 10. Lockheed Lightning fighter. 11. Douglas Dakota transport. 12. Martin Maryland bomber. 13. Grumman Avenger torpedo bomber

AEROPLANE: AMERICAN FIGHTING MACHINES PROMINENT IN THE SECOND GREAT WAR
 Photos, 1 and 9, Planet News; 2, 6, and 8, British Official; 3, Associated Press; 4, 5, 11, 12, and 13, U.S. Official; 7, Boeing Aircraft Co.; 10, Central Press



1. Heinkel 177, German bomber (seen from below) with two double engines. 2. Junkers 87 dive-bomber; it carries a bomb load of 4,000 lb. 3. Dornier 217 bomber. 4. Junkers 290, primarily a transport but also used as a bomber. 5. Messerschmitt 109 single-seat fighter; top-speed about

400 m.p.h. 6. Focke-Wulf 190 fighter-bomber. 7. Yak 1, Russian single-seat fighter. 8. Stormovik, Russian low-level attack bomber. 9. Macchi C202, Italian fighter. 10. Mitsubishi "Zeke," Japanese fighter, which has been nicknamed the Zero. 11. Mitsubishi "Betty," Japanese bomber

AEROPLANE: SELECTED GERMAN, RUSSIAN, ITALIAN, AND JAPANESE WAR AIRCRAFT

Photos, 1 and 4, British Official; 2, Ilford, Ltd.; 3, 5, 6, 8, 9, 10, and 11, "Flight"; 7, U.S.S.R. Official

the wings. The Wrights had to use both hands to fly. The French quickly seized the principle of the three air controls, and Robert Esnault-Pelterie invented the control method which became standard; he used one central stick which controlled the elevator when moved fore and aft and the wings when moved sideways, and operated the rudder with his feet. This control was more natural and it left one hand free for control of the engine. Bériot is believed to have been first to suggest the use of ailerons instead of warping flexible wing-tips.

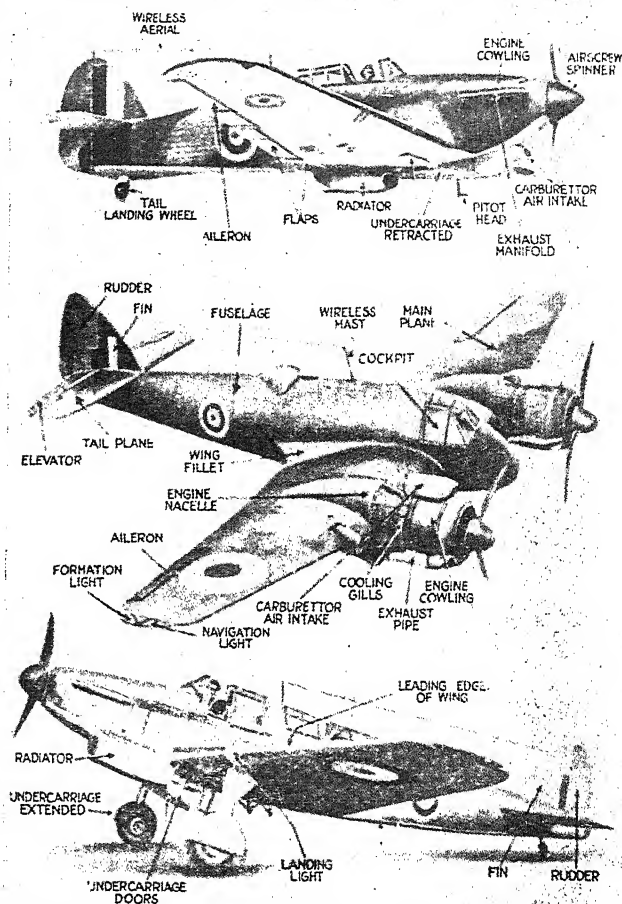
The French also broke away from the Wright design. Some French designers placed both elevator and rudder controls at the tail, although in those days there were always a dozen different general arrangements of wings, stabilising surfaces, and air controls to be seen whenever a flying meeting was held.

British Pioneers

Although the U.S.A. and France then led the world in aeroplane construction, experimenters were at work elsewhere. Among the earliest designers and constructors in Great Britain after Pilcher and Maxim were Weiss, A. V. Roe, the Short brothers, Dunne, S. F. Cody, T. Howard Wright, and Howard Flanders. After Lillenthal, Schellies had been at work in Germany, Ellehammer in Denmark, and Fokker in Holland, and in America Curtiss had become prominent. In 1903 T. Howard Wright opened the first aeroplane factory in Great Britain under the railway arches in Battersea, London.

A. V. Roe claimed a flight of 60 yds. at a height of two ft. on June 8, 1908, in a biplane of his own construction fitted with an Antoinette engine, but the first officially observed flight in Britain was made by J. T. C. Moore-Brabazon (Lord Brabazon of Tara) on Feb. 27, 1909, in a Voisin biplane at the Isle of Sheppey. On Dec. 18, 1910, T. O. M. Sopwith flew 169 miles from Eastchurch to Tirlemont (Belgium) in a Howard Wright biplane with a 60 h.p. E.N.V. engine and won the Baron de Forest £4,000 prize. This aircraft was all-British.

In Jan., 1939, the French Aero Club issued its first list of pilots' certificates with eight names. These were Delagrèze (who made a solo flight of 60 yds. in an aeroplane of his own design in the spring of 1907), Dumont,



Aeroplane. Key to the names of principal parts. The upper machine is a Hawker Hurricane; centre, Bristol Beaufighter; below, Fairey Fulmar
Courtesy of "Flight"

Esnault-Pelterie, Farman, Wilbur and Orville Wright, Ferber, and Blériot. The first eight British pilots certificated by the Royal Aero Club—J. T. C. Moore-Brabazon, Hon. C. S. Rolls, Alfred Rawlinson, Cecil S. Grace, G. B. Cockburn, C. Grahame-White, Alec Ogilvie, A. Mortimer Singer—were better known for their skill as pilots than for any renown as designers. In 1910 G. de Havilland (later Sir Geoffrey) built his first aeroplane, and crashed it on his first attempt to fly it, fortunately without injury to himself.

EARLY WAR MACHINES. In 1909 Mr. Haldane, then secretary for War, instituted the advisory committee for aeronautics, composed of army, navy, and scientific members, and a department was opened at the National Physical Laboratory to investigate aviation

problems. It worked closely with the Balloon Factory, later the Royal Aircraft Factory, and still later the Royal Aircraft Establishment. In this factory under Mr. (later Lt.-Col.) Mervyn O'Gorman as superintendent, a brilliant team worked, which included de Havilland, Folland, Busk, and Irving. Here were designed the Factory series of army aeroplanes, the B.E., F.E., R.E., and S.E., which were widely used in the First Great War. The B.E. aeroplanes were designed to be, and were, extremely stable; some alleged they were too stable for war aeroplanes. All were biplanes, for a series of accidents with monoplanes in the Royal Flying Corps in 1912 led to a War Office ban on monoplanes.

The First Great War was largely fought in the air with

biplanes. But there were certain notable exceptions. The Germans used the Etrich and Fokker monoplanes, and the Fokker triplane. The British used the French Blériot and Morane monoplanes, and the Sopwith triplane. The biplane continued to hold first place during the decade succeeding the First Great War; exceptions were the German Junkers, Dornier, and Messerschmitt transport aircraft; the Dutch Fokker transport aircraft; the Supermarine and Macchi Schneider Trophy racing seaplanes; occasional experimental military aircraft, and a few civil aeroplanes. One or two triplanes persisted in the years immediately following the end of the First Great War, notably the Bristol Pullman and the Parnall Postal.

Before the First Great War there was little distinction between civil and military aeroplanes, and in many instances, none. During that war the military aeroplane was developed to the exclusion of the civil type, and the first transport aeroplanes of the post-war period were conversions from military designs. The great trans-oceanic and transcontinental flights that succeeded the end of the First Great War—the first direct Atlantic flight (*q.v.*), the first England to Australia and England to South Africa flights—were all made in converted British Vimy bombers. Soon, however, the needs of civil air lines required the production of specialist aeroplanes, and to meet the demand a developing branch of the aircraft industry was devoted to the production of civil aircraft. In Britain were produced the D.H.14, D.H.16, and

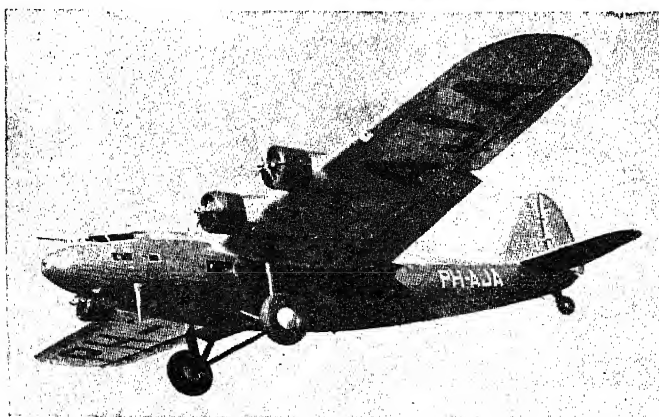
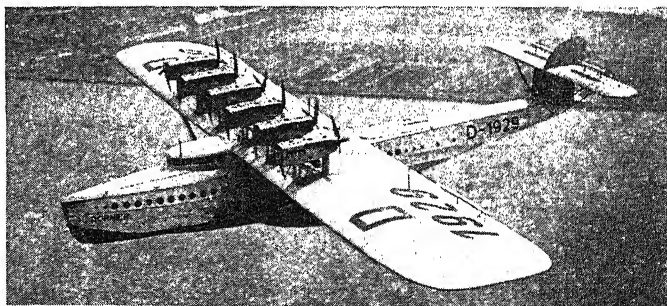
D.H.18 single-engined; the Handley Page W.8 and W.10, the D.H.84 and 89 two-engined; the Armstrong Whitworth Argosy and D.H. Hercules, three-engined; and the Handley Page Hannibal and Heracles, the Short Scylla, and D.H.86 four-engined air-liners. Among the early civil transport flying boats were the Supermarine Sea Eagle, the Short Calcutta and Kent (*Scipio* class). All these civil aeroplanes were biplanes; they were the commercial pioneers of the Commonwealth air routes.

DESIGN AND CONSTRUCTION. Simultaneous advances are recorded in design and construction. The earliest aeroplanes, built of wood members braced with piano wire, with fabric-covered wings, and often open or partly open fuselages, were replaced by superior structures using swaged

wire bracing, streamlined where exposed to the air. During the First Great War, Junkers developed all-metal aeroplanes. In 1920 Short Bros. in England produced an experimental all-metal biplane, the Silver Streak. Plywood was often used instead of fabric. Fokker developed plywood-covered wings. D.H.9 fuselages were plywood-covered.



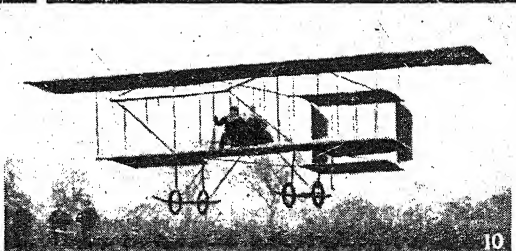
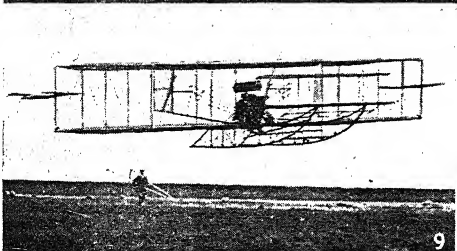
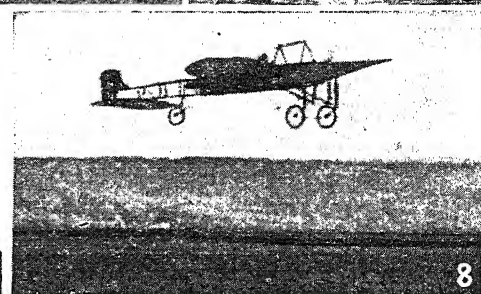
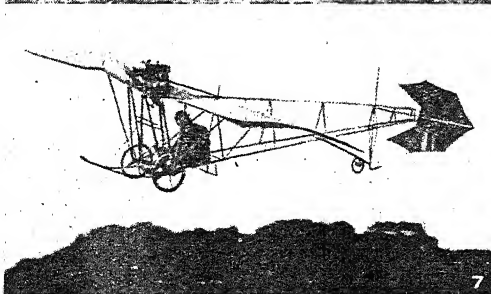
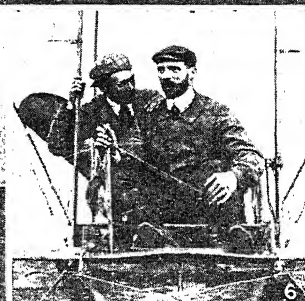
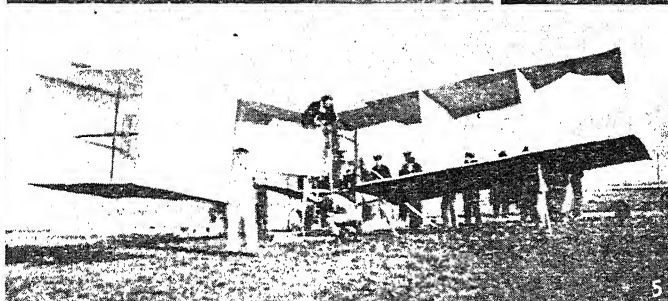
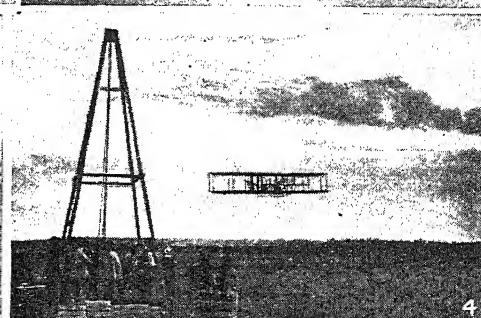
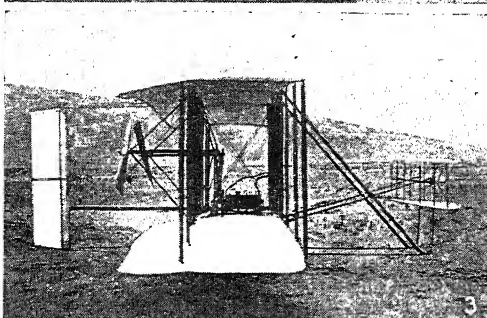
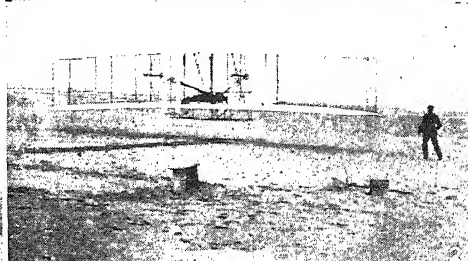
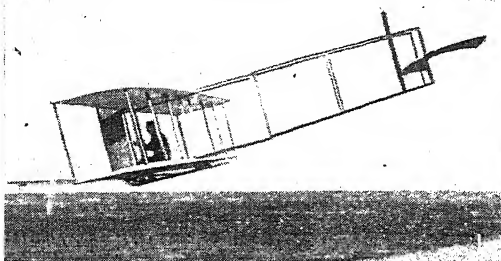
Aeroplane. D.H.2, a rotary-engined pusher machine of 1914-18, designed by Sir Geoffrey de Havilland



Aeroplane. Upper, Dornier Do.X, a flying-boat built in 1929; she weighed 55 tons and had twelve 615 h.p. engines. Lower, Fokker F.36; the wings were of wooden cantilever construction, the fuselage built up of steel tubes

Plywood monocoque fuselages were developed; these dispensed with struts; the bending and torsional stresses were taken through the plywood skin of the hollow tubular structure. Stressed-skin fuselages were also made in metal, as in the Silver Streak, the first example. During the decade succeeding the First Great War, most British aeronautical engineers developed composite metal and wood airframes before producing all-metal airframes; these they covered partly with detachable metal panels and partly with fabric.

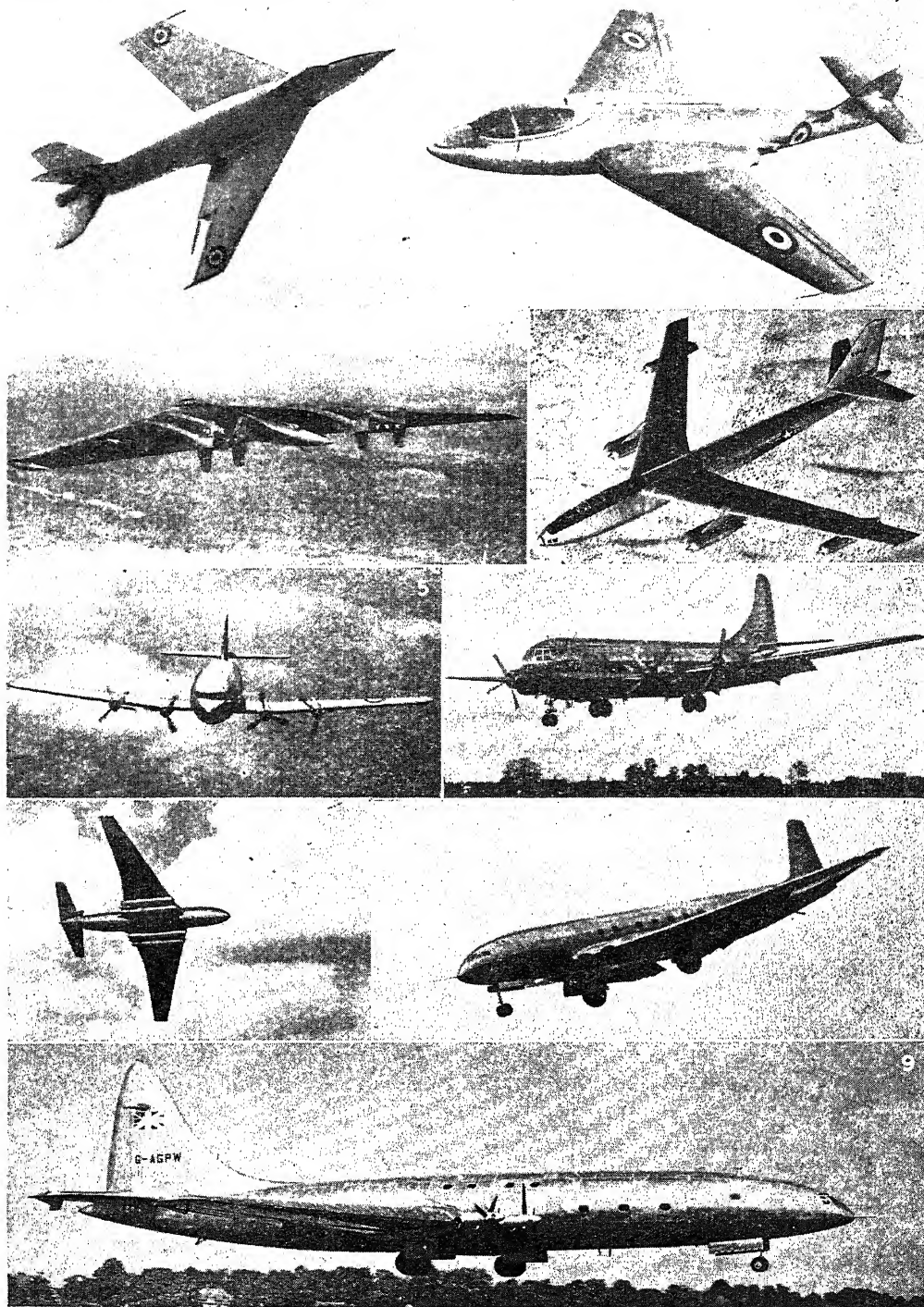
Aerodynamic theory was then developing rapidly, and unerringly it pointed towards the adoption of the monoplane. The earlier theory of resistance, based on the



1. One of the Wright brothers landing his glider, 1902.
2. Orville Wright's first flight in a powered plane, 1903.
3. Original Wright machine. 4. Wilbur Wright creating a record of 50 miles in 1908. 5. Santos-Dumont's biplane of 1906. 6. Farman, first airman to fly 100

miles, at the controls, 1909. 7. First light aeroplane, built in 1908 by Santos-Dumont. 8. Bleriot crossing the Channel, 1909. 9. Moore-Brabazon flying his Short-Wright biplane for the "Daily Mail" prize, 1909. 10. Paulhan completing London-to-Manchester flight, 1910

AEROPLANE: HISTORIC MACHINES AND THEIR ACHIEVEMENTS FROM 1902 TO 1910
3, from a photograph in the Science Museum, South Kensington

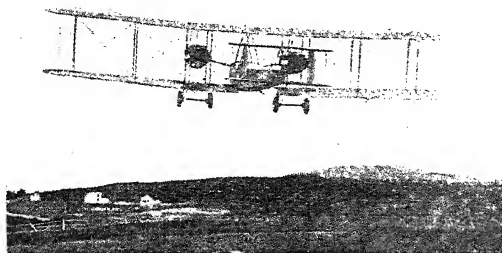


1. Vickers-Armstrong P530 jet fighter, first British aircraft to have swept-back mainplane and tail unit. 2. Hawker Prowler jet fighter, which during trials flew from London to Paris in 20½ minutes. 3. Northrop B-49 Flying Wing, eight-jet bomber. 4. Boeing B-47

Stratojet bomber with a max. speed of over 600 m.p.h. 5. Armstrong Whitworth Apollo, airscrew-turbine transport. 6. Boeing Stratocruiser built for B.O.A.C. 7 and 8. De Havilland Comet, world's first pure jet air-liner. 9. Bristol Brabazon I, largest of civil aircraft

AEROPLANE: OUTSTANDING MILITARY AND CIVIL AIRCRAFT OF 1949

1 and 9, Topical; 2 and 7, P.A.-Reuter; 3, New York Times; 4, 5, 6, 8, Central Press



Aeroplane. Alcock and Brown in their Vickers Vimy biplane at the start of their pioneer Atlantic flight (1919)

projected frontal area (reduced by efficient streamline) plus parasitic drag, was augmented by Prandtl's mathematical solutions of induced drag and his boundary layer theory of streamline bodies which established that laminar flow (i.e. the flow of air close to the surfaces of the aeroplane body and wings) was a factor of importance in stability and relative resistance. The stability provided by the Handley Page slotted wing was due to its control over laminar flow at large wing angles, preventing wing tip stall. During the Second Great War, American heavy day bombers dispensed with paint camouflage because a smooth polished metal surface gave them a gain of several m.p.h. in speed.

The introduction of the monoplane with a retractable undercarriage as the standard type of aeroplane dated from about 1930. It is noteworthy that its earliest application was to civil aircraft, for the prejudice against the monoplane for military purposes died slowly. The use of the American Lockheed Orion, Vega, and 14, the Douglas DC-2 transport monoplanes, and the French Wibault, and German Junkers 52/3m, marked the beginning of air transport schedules that reduced air travel time between cities; the previous 90-120 m.p.h. cruising speed range was increased by these aeroplanes to 145-170 m.p.h. America introduced the DC-3, a 21-passenger monoplane cruising at 180 m.p.h. France brought out the Bloch 220, Britain the Atalanta, Ensign, Albatross, and Flamingo; Germany produced the Junkers 86 and Heinkel 111, and Italy the Fiat B.R.22 and the Savoia Marchetti 83. Britain introduced the Short Empire flying boats, and from America came the Boeing Clipper. All these commercial aircraft appeared between 1930 and 1939.

In the period 1938-1945 characteristics of military and civil

aircraft were: increased speed; increased structure weight and disposable load; the employment of greater horsepower and, sometimes, as in the Airacobra, shaft drive from a buried engine to its airscrew.

The Mosquito flew at over 400 m.p.h., the Spitfire XIV and P-51 Mustang at 450 m.p.h., and jet-propelled aircraft (Messerschmitt 262, Arado 234, Meteor, and Airacomet) in excess of 500 m.p.h.

The Liberator bomber stalled at 80 m.p.h., the Whirlwind fighter at 83 m.p.h., and the Mosquito and Fw. 190 landed at over 100 m.p.h.

After 1938, wing loading sometimes reached new records—Halifax 50 lb. sq. ft.; Liberator over 54 lb.; Lancaster over 55 lb. Almost all aeroplanes incorporated flaps. The Halifax had slotted trailing edge flaps, the Liberator had Fowler flaps, and the Lancaster split trailing edge flaps.

Split flaps opened from the lower surface of the wing. The

aeroplanes (whether the latter were converted warplanes, as in the York and Lancaster, or new designs, as in the Brabazon) were improved aerodynamically and better streamlined; higher speed, climb, and ceiling; higher land-

ing speed; increased structure weight and disposable load; the employment of greater horsepower and, sometimes, as in the Airacobra, shaft drive from a buried engine to its airscrew.

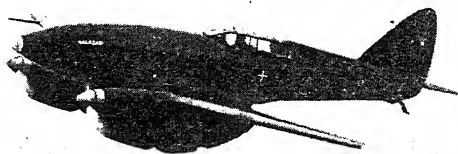
Depression of the Handley Page flap opened a leading edge slot. The Junkers flap was a variable angle aerofoil permanently fixed below the main wing trailing edge. The Fairey-Youngman flap (Barracuda) could be set like the Fowler flap for landing or like the Junkers flap for taking off, or could be set as an airbrake. Flaps were usually operated hydraulically or electrically, and only at reduced flying speed. Aeroplanes were trimmed in flight by adjustable trimming tabs hinged to the trailing edges of the air controls.

During this period only fighter aeroplanes were fitted with jet reaction prime movers; heavy bombers had attained maximum speeds of about 300 m.p.h., and medium bombers about 400 m.p.h. A few military and civil aircraft had pressurised cabins, notably the Superfortress and Mosquito XVI.

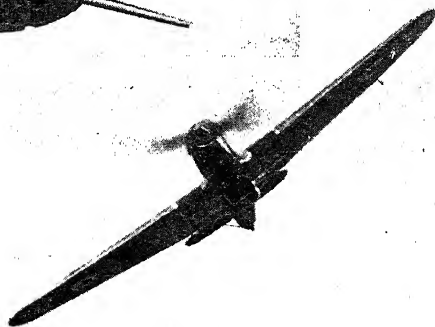
This period saw the introduction of towed gliders for military transportation. Germany was the first to put this method into use, in 1940. Britain subsequently employed larger and better gliders, and by 1944 could transport small tanks by air in the Hamilcar glider towed by Stirling or Halifax tugs. The American glider (Waco) was smaller, carrying only 2 tons load, the British Horsa carried 3 tons, and the Hamilcar 8 tons. (See Glider.)

The scientific use of light alloy structures for monoplane metal wings solved the problems of bending moments with their resulting compression and tension loads,

also the formerly feared wing tip torsion. Nevertheless, wood structures, or composite

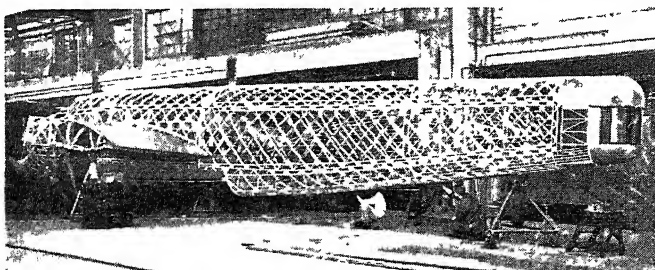


Zap flap was a split flap, of which the hinge line moved backward to increase the area of the lifting surface. The Fowler flap was a curved aerofoil which moved back and down until it was clear of the trailing edge. The Gouge flap (Stirling bomber) was similar.



Aeroplane. Upper: De Havilland Comet, an all-wood, stressed skin monoplane, winner of the England-Australia race in 1934. Lower: Hawker Hurricane, a single-seater fighter, which gave remarkable performance

Upper photo, courtesy of "Flight"



Aeroplane. Geodetic fuselage construction, intersecting spiralled metal bars giving a basket-like form which is preserved without any internal beam or spar
Courtesy of "Flight Handbook"

metal and wood, were not everywhere surpassed, as the de Havilland Albatross and the subsequent Mosquito amply proved. The universal advance in aerodynamic knowledge was revealed in the external form, but various means were employed by different aeronautical engineers to secure ease of manufacture and adequate strength within the essential external characteristics which governed the aerodynamic qualities of the clean monoplane, notable among these being B. N. Wallis's geodetic "basketwork" airframe and wing design.

New developments began others. Variable pitch airscrews were followed by constant speed and fully feathering airscrews. As translational speed and flying height increased, more blade area was required to transmit into thrust the torque of the more powerful engines, and so came airscrews with five blades rotating in one direction, and contra-rotating airscrews with four and six blades. Retractable tricycle undercarriages were developed; these gave greater latitude in speed when alighting, because all wing lift was destroyed when the three wheels touched ground. Devices for de-icing the leading edges of wings were produced, mainly in the form of rubber sleeves through which compressed air was passed to break up ice crustation. Automatic pilots and visual instruments were invented to enable pilots to fly blind through all weathers. High-frequency radio beams were developed to provide an invisible guide line to a safe landing on a fog-bound aerodrome. Radar (*q.v.*) provided aircraft with anti-collision apparatus, and means to navigate when flying blind. Wireless telegraphy and radio telephony gave continuous contact between ground and air and between airborne aircraft.

Military and civil aeroplane developments have always been

scientifically interlinked, although civil aircraft have to incorporate higher standards of safety and comfort; it was to be expected, therefore, that experience gained in the manufacture of military aircraft during the Second Great War would be embodied in greatly improved transport aeroplanes built after it. This expectation was quickly realized in the construction by 1950 of giant passenger aeroplanes like the Boeing Stratocruiser and Bristol Brabazon, of the jet-propelled air-liner the D.H. Comet, and of the Armstrong-Whitworth turbo-propeller air-liner Apollo. These and other post-war types are illustrated in p. 136. Detailed information about all the more important aircraft, military and civil, will be found under their own names.

Aerosols. Colloids in drop solution suspended (like a mist), in the air. Spraying the air in crowded indoor places with solutions of bactericides (disinfectants) in the form of aerosols has been found effective in preventing the spread of disease. *See* Colloid.

Aerostatics (*Gr. aer, air; statikos, at a standstill*). Term originally used to denote the science which deals with atmospheric pressure, the equilibrium of the atmosphere and other gases and the control of such objects as balloons. The word is used in the study of the art and science of air navigation as applied to lighter-than-air craft, *i.e.* an airship which is buoyant in the air because its gas envelope contains hydrogen or helium, gases which make the all-up weight lighter than the volume of air which the aircraft displaces throughout its altitude range. *See* Aeronautics; Airship; Flight.

Aerschot. Town of Brabant, Belgium. It is on the Demer river, 22 m. N.E. of Brussels. Fierce fighting took place here in the opening stages of the First Great War. Particularly severe

German atrocities were committed in the town during an occupation that lasted from Oct., 1914, until the autumn of 1918.

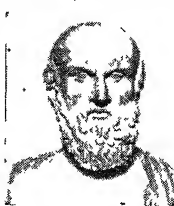
Aeschi. Swiss summer resort. It is in the Frutigen dist. of the canton of Berne, between Lake Thun and the Kander valley, 7 m. S. of Spiez.

Aeschines (389-314 B.C.). Athenian orator and statesman. After serving with distinction at the battle of Tamynae (*c.* 350 B.C.) against Callias, tyrant of Calchis, he became a government clerk, then an actor, and later a clerk again. Entering politics, at that time dominated by the Macedonian menace, he soon won prominence by his eloquence.

Aeschines was a member of several embassies to Philip of Macedon, and he probably succumbed to bribery, for he became leader of the party which urged the futility of resistance. Demosthenes did not hesitate to accuse him of corrupt motives. After the Macedonian victory at Chaeronea (338), Ctesiphon, a friend of Demosthenes, proposed that a golden crown be given to Demosthenes for his services to the state. Aeschines, in 330, prosecuted Ctesiphon on technical grounds. Demosthenes' speech for the defence (*De Corona, on the Crown*), in which he justified his whole anti-Macedonian policy, was a masterpiece, and the verdict went against Aeschines, who retired into exile. Though he had not the education of his great opponent, Aeschines had probably more natural eloquence, and in the judgement of antiquity his oratory was second only to that of his rival.

His three extant speeches are said to have been called the *Three Graces*. *Consult* Attic Orators. R. C. Jebb, 1876.

Aeschylus (525-456 B.C.). Greek tragic poet. He was born at Eleusis, a town of Attica. The



Aeschylus, Greek tragic poet
Bust at Capitol, Rome

prime of his life embraced the period when Greece was struggling for independence against Persia. He fought with distinction in the battles of Marathon (490) and Salamis (480). In 499 he first entered for the prize offered for the best tragedy, but it was not until 484 that he obtained first place. The later years of his life

were spent largely away from Athens, two, perhaps three, visits being made to Sicily, where he died at Gela.

Seventy tragedies in all are credited to Aeschylus, of which only seven survive. Of these the best are *The Persians*, an expression of the sense of triumph felt by the Greeks after the Persian Wars; *Prometheus Bound*, a majestic portrayal of the myth of Prometheus, who stole fire from heaven, and taught the arts to mankind; and the great trilogy of the Agamemnon, Choephoroi, and Eumenides, which relates the return of Agamemnon from Troy, and his murder at the hands of Clytaemnestra, his unfaithful wife; the vengeance exacted by his son Orestes, who kills his mother and her paramour; the pursuit of Orestes by the Furies, and his absolution by the Areopagus at Athens. The Agamemnon is the greatest of all the plays of Aeschylus and one of the world's masterpieces of dramatic literature. Seeing the wicked often prosperous and the good unfortunate in a world ruled by supposedly beneficent deities, Aeschylus endeavoured to explain this anomaly by conceiving a force called Necessity, which underlay the actions of both gods and men, and in the end made for righteousness. The idea of a family curse operating from generation to generation is a dominant motive of more than one of his tragedies.

The characters of Aeschylus are cast in heroic mould; his lofty earnestness and magnificent imagery make him one of the most sublime of the world's poets. Before the time of Aeschylus the action of a play was evolved from the dialogue between the chorus and a single actor. Aeschylus introduced a second actor, thus rendering practicable dramatic possibilities hitherto unthought of. There are English verse translations of the plays by E. H. Plumptre, Lewis Campbell, and Gilbert Murray. Consult Aeschylus, Creator of Tragedy, Gilbert Murray, 1940.

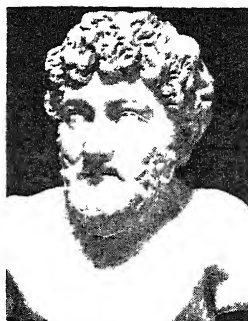
Aesculapius. Roman, and better known, name of the Greek god Asclepius. In classical mythology he was the god of medicine, though Homer speaks of him as a mortal. The son of Apollo and Coronis, he was a pupil of the centaur Cheiron. By his knowledge of the healing art he was able to restore the dead to life, and his use of this power aroused the anger of Zeus, who killed him

with a thunderbolt. In later times the chief seat of his worship was Epidaurus, where his temple served the purpose of a modern hospital. A guild called the Asclepiadae, of which Hippocrates was a member, was formed of his supposed descendants. The symbol of Aesculapius, a staff with a serpent twisted round it, is the badge of the R.A.M.C.

Aesculin. Glucoside discovered by Minor in 1830 in the bark of the horse-chestnut, *Aesculus hippocastanum*. In aqueous solution it exhibits a beautiful blue fluorescence which disappears on adding an acid. With nitric acid a yellow solution is formed which turns to a characteristic blood-red colour on adding ammonia.

Aesica. Roman stationary camp at Great Chesters, on the line of Hadrian's Wall, Northumberland, England. It was occupied by the second cohort of an Iberian legion recruited from Asturias. Water was brought from the Caw Burn along an open channel 6 m. long. Two exquisite late-Celtic bronze brooches, now in the British Museum, were found there.

Aesir. Plural of As and the collective name for the chief gods of Norse mythology. They included Thor, Baldr, Njörd, Frey, Loki, who with Freyja and other goddesses dwelt in Asgard (home of the gods). They waged war against the powers of evil and were themselves threatened with



Aesop, famous Greek fabulist
Bust in Villa Albani, Rome

destruction by Ragnarok, the twilight of the gods.

Aesop (c. 620–560 B.C.). Traditional author of the famous collection of fables. A native of Phrygia and originally a slave in Samos, he is said to have won the favour of Croesus, king of Lydia, who employed him on important missions. One of these was to Delphi, and Aesop, giving offence to the

Delphians, was thrown over a precipice. Tradition represents him as very ugly but very witty. The fables in Greek verse by Babrius (3rd century A.D.) and in Latin verse by Phaedrus (q.v.) contain translations or adaptations of many fables ascribed to Aesop.

Aesthetics (Gr. *aisthetikos*, perception). Body of mental concepts leading to a theory of beauty. The term Aesthetic is defined in the Oxford English Dictionary as "the philosophy or theory of taste or of the perception of the beautiful in nature and art." One of its purposes is to define the beautiful and to analyse the attitude to it of the human mind. The beautiful in its essence is a theme for the professed philosopher, though its concrete manifestations in nature and art appeal to the general intelligence.

Response to the perception of beauty does not move a person to action, but is contemplative, harmonious, restful, and disinterested in the sense that to enjoy beauty we do not monopolise—as in the pleasure of eating, for example—but share with others the satisfaction it affords. Objects which provide aesthetic satisfaction are in several categories, e.g. beauty in the ordinary sense, the sublime, the characteristic, and even the ugly.

What is presented in the arts affects us essentially in the same manner as the aesthetic material presented by nature, though there are differences, e.g. a great building may impress the beholder by its sublimity,



Aesculapius. Votive panel representing the god of healing, his daughter Hygieia, and two worshippers
National Museum, Athens

as does a mountain cliff, but it is also to be appreciated as a purposeful work of human hands. The discussion of the beautiful in art has for its practical end the establishment of a basis for art criticism, and this is sometimes called practical aesthetic. It concerns itself with the purely artistic qualities of form, design, and technique, as distinct from utilitarian purpose, not only in architecture, painting, sculpture, ornament, etc., but in poetry, drama, and other creative literary arts—although the modern development in the perception of the beauty that is inherent in fitness for purpose, has made the purely aesthetic qualities of, for example, architecture, more difficult to isolate. The devotees of "functionalism" derives equal aesthetic satisfaction from the contemplation of the lines of a sailing yacht or of a steel girder bridge like the Forth Bridge, and those of a factory building well planned for its purpose, or even a well-white-washed wall, all of which are entirely functional in purpose, the beauty being incidental.

Art concerns itself not only with the product, but with the conditions of production, the psychology of the artist, the character of the impulse from which artistic activity proceeds. This activity, like the appreciation of the beautiful, is an unconstrained ideal activity of a disinterested kind in that it is an end in itself. The only reason for indulgence in conscious and unrestrained artistic activity is that the agent takes pleasure in it. To define the nature of this pleasure is one of the problems of aesthetics, and no theory yet commands general assent. *See also* Architecture; Art; Criticism; Design; Drawing; Painting; Sculpture, etc.

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Aestheticism. In its full and strict sense, the practice of the theories of aesthetics. The word was popularised in the latter half of the 19th century by a group of notable artists and craftsmen, including Dante Gabriel Rossetti and William Morris, who revolted against the general ugliness of Victorian architecture, art, decoration, and furniture, and strove to educate public taste to appreciate better things. The movement they started was carried to ex-

tremes by younger men of brilliant wit but not impeccable judgement, among whom Oscar Wilde was chief, and aestheticism came to connote an affectation which was killed by ridicule. The Gilbert and Sullivan opera *Patience*, 1881, and George du Maurier's satirical drawings in *Punch*, assisted in the kill.

Aestivation (Lat. *aestivare*, to pass the summer). In zoology, the summer sleep of animals, resembling the more common hibernation, or winter sleep. It is seen chiefly in molluscs and freshwater fish, which are enabled by it to endure a dry condition.

The African mud fish (*Protopterus*) inhabits streams which dry up in the summer. The fish then forms a kind of cocoon in the mud, in which it coils up and goes to sleep until the rainy season returns. Land snails retire in dry weather into the ground or sheltered crevices, where they secrete an epiphragm or thin film over the aperture of the shell to prevent evaporation. They then become dormant until rain again brings them out.

Aetas. Aboriginal inhabitants of the Philippines. They are frizzy-haired, round-headed, broad-chested, and long-armed negro hunters, about 4 ft. 6 ins. tall. They use bamboo spears and poisoned arrows, wear breechcloths, erect rude shelters, and preserve a primitive culture and low animism. *See* Negrito.

Aethelred. Alternative spelling of the name of two Anglo-Saxon kings of England. *See* Ethelred. Similarly, except Athelstan, generally spelt thus, other Saxon names beginning with Ae will be found under E.

Aëtius (d. A.D. 454). Roman general under Valentinian III, Roman emperor of the west. He defended the frontiers of the Empire for nearly 20 years, and in 451 defeated Attila near Châlons. His son was betrothed to Valentinian's daughter, but in 454 the emperor, suspecting that Aëtius had designs upon the throne, killed him.

Aetolia. District of ancient Greece. It was bounded S. by the Gulf of Corinth, W. by the river Achelous, N. by Epirus and Thessaly, and E. by Locris and Doris, and is now included in the modern Greek nome or prov. of Acarnania and Aetolia. Almost wholly mountainous its people were hardy, warlike, and turbulent. After 146 B.C. Aetolia was included in the Roman prov. of

Achaëa. In the 13th century it passed to a Byzantine prince, in the 15th to Scanderbeg and Venice, and later to Turkey. Aetolia produces currants, wine, tobacco, and maize. It is rich in remains of ancient fortifications. Chief towns, Missolonghi and Lepanto. *See* Acarnania.

Aetolian League. Federation of Greek cities after the death of Alexander the Great. Originally based on Aetolia, the conquest of Boeotia in 245 B.C. gave it control over the whole of central Greece. Threatened by the Macedonians and the Achaean League, the Aetolians allied themselves with the Roman invaders, only to be disappointed in their hopes, for war with Rome followed, and from 189 B.C. the Aetolian League was little more than a name. *See* Achaean League; Greece.

Afar. Hamitic tribes of East Africa. *See* Danakilis.

Affection (Latin *afficere*, to affect). In psychology, a mental condition characterised by disturbance differing in kind and degree, the result of sudden or violent impressions. Formerly, affections were regarded as sensations, but are now considered to be conscious processes set up by stimuli (forms of excitement), not limited to particular organs of the body. *See* Psychology.

Affettuoso. Musical term, derived from the Italian, and meaning lovingly, feelingly.

Affidavit (Lat. he has sworn). In English law, a statement put into writing, and then sworn to and signed by the witness, who is called the deponent. The oath may be administered by any person who has authority to administer oaths in the court where the affidavit is to be used, usually a commissioner for oaths: or, abroad, by a British consul. J.P.s and registrars of county courts have also power to swear deponents in some circumstances. The deponent attends before the commissioner, signs the affidavit, and the commissioner repeats the words: "You swear that this is your name and handwriting, and the contents of this your affidavit are true, so help you God." The deponent may affirm, if he wishes, instead of swearing. At the trial of an action, facts must usually be proved by calling witnesses, but the court has power to order facts to be proved by affidavit unless a witness is reasonably desired and can be produced. Affidavits are, however, used in interlocutory proceedings other than trials.

Affiliation (Latin *ad*, to; *ilius*, son). Legal term meaning the fixing of the paternity of a bastard child. Proceedings may be taken against the man by the mother or a local authority or the national assistance board in a magistrate's court. They must be begun before the birth or within 12 months thereafter; and, upon paternity being proved, the magistrate may order the father to pay a sum to cover lying-in expenses, and not exceeding 10s. a week until the child is aged 16.

Affinity (Lat. *affinis*, related). Biological term to express an existing relationship or connexion between different species of animals or plants, pointing to a more or less common origin. It is estimated by the resemblance of structural characters, not by functions. Thus, a similar structural basis of a fore-limb points to affinity between the two animals concerned, irrespective of whether that limb be used for flight or other method of locomotion. It is an evidence of relationship.

In chemistry, affinity is the attractive force which causes elements or their compounds to unite with other elements to form new compounds. The name chemistry has been proposed for it.

In English law the term is used to describe relationship between the husband and his wife's relatives, or the wife and the husband's relatives. Affinity is a bar to marriage in certain cases of blood affinity, i.e. between husband or wife and deceased wife's or husband's blood relatives. The table is set out in the Book of Common Prayer. Since 1907, English law has permitted the marriage of a man to his deceased wife's sister, since 1921 that of a woman to her deceased husband's brother, and since 1931 that of a man with his deceased wife's niece or aunt.

Affirmation (Latin *ad*, to; *firma*, firm). Solemn declaration made before a competent officer in place of a judicial oath. Any person who, on giving evidence, or upon any other occasions when an oath is required—e.g. on enlistment in the Army, or upon taking a seat in Parliament, when the oath of allegiance is required, or on giving evidence in a court of law—objects to be sworn, is allowed to make an affirmation instead. But he must give as his reason for objecting to an oath either (1) that the taking of an oath is contrary to his religious belief; or (2) that he has no

religious belief (Affirmation Act, 1898). By a Statute of 1833, Quakers and Moravians are allowed to affirm, and the Oaths Act of 1888 gave atheists, free-thinkers, etc., the same right. An affirmation, made as aforesaid, has the same force as an oath, a witness who affirms falsely being fully guilty of perjury. See Oath.

Afforestation. The raising of plantations of trees on land that is naturally bare or land that has not carried trees for a number of years. It is contrasted with the replacement of recently felled wood. The term may be extended to the replanting of areas of open inferior forest or of valueless scrubland. See Forestry.

Affray (Fr. *effrayer*, to frighten). In English law, a disturbance of the public peace on the part of two or more persons by acts of violence which, while not grave enough to constitute a felony, are yet of such a nature as to terrify peaceful citizens. Mere threats do not amount to an affray; there must be a blow given or a weapon drawn. Affrays are distinguished from the graver offence of rioting by the absence of any common unlawful purpose in the minds of the offenders. Thus, a sudden outbreak among persons lawfully assembled would be only an affray, at least in the first instance. But if the disturbance result in an organized raid or a faction fight, it becomes a riot.

Affreightment (Fr. *affrètement*, the hiring of a ship). Term used to describe the contract under which a shipowner agrees, for hire, to carry goods in his ship. The remuneration is called freight. When a shipowner lets the whole of his ship in one contract, it is called chartering the ship; the hirer is called the charterer; and the document is called the charter-party. A charter-party may be for a voyage or voyages, as for the round voyage to Rio de Janeiro and back; or for a period, as for a year, in which case it is spoken of as a time-charter. When the shipowner does not charter his ship, but carries goods for a number of persons, the contract of affreightment is called a bill of lading.

By the common law of England, founded, in this case, on old maritime custom common to all seafarers in Europe, a shipowner who agrees to carry goods in his ship is liable for their safety at all hazards, except: (1) Act of God. (2) Act of the king's enemies. (3) Loss occasioned by the in-

herent defect of the thing carried, as where a horse, while being carried, plunges and kicks and hurts itself; or where combustible goods, owing to the rolling of the ship, ignite, or where goods are defectively packed. But not where he has notice of the dangerous character of the goods, or their defective packing. (4) Where goods are jettisoned, i.e. are thrown overboard to lighten the ship when it is in danger.

For long, however, shipowners have introduced special clauses limiting very severely their Common Law liability. They may still include such clauses in any charter-parties and in bills of lading outside the Carriage of Goods by Sea Act, 1924. This Act applies only to shipments abroad from a port in this country. Special agreements may still be made for goods not "ordinary commercial shipments made in the ordinary course of trade." The present British law now conforms with the recommendations of an International Conference held at Brussels in 1922.

Affric. Glen, river, and lake of Inverness-shire, Scotland. The glen is considered to be the most beautiful in the U.K., and the river, 18 m. long, passes through it and the lake to join the Glass river.

Arfrontée (Lat. *ad frontem*, to the brow or face). In heraldry, the figure of a living creature, a skeleton, or a helmet placed full face.

Afghan Hound. Breed of dog, probably an offshoot of the Arabian Saluki. A hunting dog in its native country, the Afghan can be trained as a highly intelligent and companionable home dog



Afghan Hound. Dignified specimen of this breed of large dog
Photo, "The Times"

The usual height is 27 to 29 ins. The characteristic shock of silky hair on the top of the head and the contrast of short hair on the back with long hair on quarters and legs give it an appearance that is eccentric but dignified.

AFGHANISTAN: A BUFFER STATE

Evans Lewin, former Librarian, Royal Empire Society

A succinct description of this country and its turbulent history.

Other information will be found under the headings Amanullah; Herat; Kabul; Kandahar; Khyber Pass; North-West Frontier; Pandyah; United Nations, etc.

Afghanistan is a country lying N.W. of Pakistan and forming a buffer state between the U.S.S.R. and that dominion. It is bounded W. by Persia, N. by territory of the Turkmen, Uzbek, and Tadzhik S.S.R., and E. and S. by Pakistan; in the N.E. it touches Kashmir and China. Its length from the Persian frontier to the Khyber Pass is about 600 m., extreme breadth N. to S. about 500 m., estimated area 250,000 sq. m.

Ethnographically Afghanistan embraces the region between the rivers Oxus (Amu-Daria) and Indus, but its political frontiers enclose a smaller area. The E. and S.E. Afghans were conquered by the Sikhs, became either part of British India (e.g. N.W. Frontier province) or semi-independent communities (e.g. Chitral), and later joined Pakistan. Afghanistan's frontier with the U.S.S.R. follows the decisions of the Russo-Afghan boundary commission of 1884-86 and the terms of an agreement signed in 1948. The boundary runs N.E. from Zulfikar to the Amu-Daria, and is mainly of an artificial character, protected by fortresses. From Khamiab the Amu-Daria forms the frontier, which continues along the river Panjah into the Pamirs. Passing through a mountainous snow-covered region, it ends on the borders of China near one of the breaks in the Sarikol range. Bending sharply S. and thence W., the boundary runs roughly parallel with the Panjah for about 50 m. and encloses a strip of territory known as Wakhan, dividing the Pamirs from Chitral. From this point S. the frontier is purely strategic.

Scientific Frontier

After the Afghan War of 1878 the scientific frontier, so termed by Lord Beaconsfield, was established so that the ameer's dominions should not include the semi-independent Pathan tribes in the hills N.W. of India. In 1893 a delimitation was agreed upon. Chitral, Bajaur, Swat, and Waziristan were recognized as within the British sphere of influence, while Kafiristan continued under Afghan control. The frontiers S.W. from the Khyber Pass are mainly deter-

mined by tribal and geographical considerations until a point S.W. of Quetta is reached. Here the boundary strikes due W., crosses the Helmand desert, and reaches Persia at the Koh-i-Malik-Siah, from which mountain it runs approximately due N. and is mostly undefined.

Afghanistan is mainly mountainous, broken by deep ravines and fertile valleys. From the N.E. it is crossed by the lofty ranges of the Hindu Kush, the W. continuation of the Himalayan system, striking off from the Pamir plateaux. Here peaks reach 24,000 ft. in height. The Hindu Kush, with its W. continuation, forms the backbone of Afghanistan and divides Afghan Turkistan in the N. from the Helmand desert regions in the S. Of the mountain passes, upwards of twenty in number, the Kushan Pass in the Hindu Kush is 14,350 ft. up, and few are below 12,000 ft. Numerous rivers rise in these ranges or enter the country from the N. They include the Amu-Daria; the Murghab, which rises in the Fruz Koh and runs N. through the city of Merv; the Helmand, rising in the Hindu Kush and flowing 680 m. S.W. into Lake Hamun; the Hari Rud, rising in the Hindu Kush and flowing 500 m. W. into Persia; and the Kabul, which joins the Indus at Attock. There are numerous small lakes, the most important being the Ab-i-Stada in Ghilzai.

INDUSTRIES AND COMMUNICATIONS. Generally healthy and dry, the climate is marked by extreme variations of temperature. For example, whereas at Kabul and in the N. the winter is severe, at Jalalabad it is almost as mild as in India. In all parts the heat is great during summer. In the S. and E. districts there are two harvests. The spring crop consists of wheat, barley, and lentils; the autumn harvest produces rice, millet, sorghum, tobacco, beet, and maize. All European fruits, especially grapes, are grown, and an extensive trade is carried on in these products. In the warmer districts, sugar-cane and cotton are grown. Copper, iron, and gold are worked. Silver was at one time plentiful. Gypsum, petroleum, asbestos, sulphur, and

lapis lazuli occur. Of manufactured articles, silk and carpets are the chief; Herat is a depot for the carpets of Central Asia. Kabul and Kandahar have factories, while hydro-electric schemes are being set up under government supervision. Reliable trade statistics are not available, but exports for 1945-46 were valued at £13,740,000, four-fifths of which was with India (and Pakistan). Textiles, cement, machinery, tea, coffee, cocoa, and drugs are the chief articles of import; wool and skins of fat-tailed sheep, cattle, horses, fruit, silk, and carpets the principal exports. Domestic animals include camels, goats, and dogs.

The lines of communication are through the valleys and across the mountain passes. The most important of all the frontier routes are those connecting the Amu-Daria regions and the highlands of Central Asia with Kabul, and those leading from Kabul to the plains of India. From Russia to Herat there are four distinct lines of advance: from the Caspian by the route through Meshed; from Chikishliar, on the Caspian, to Merv; from Tashkent; and through Balk in Afghan Turkistan. Herat and Dehdadi, near Balk, form the strategic keys to N. Afghanistan.

Four Famous Passes

Connecting with Pakistan there are four principal lines of communication: from Peshawar through the Khyber Pass leading to Jalalabad and Kabul; from Bannu over the Peirwar Pass to Kabul; through the Gomal Passes to Ghazni; and from Quetta through the Bolan Pass to Kandahar. This last is one of the world's great strategical positions, and is connected with the Indian railway system. A line has been carried through the Khwaja Amran range to the Afghan borders at New Chaman, where it opens on the route to Kandahar. Farther E. main rlys. run to Jamrud at the entrance of the Khyber Pass.

POPULATION AND GOVERNMENT. Afghanistan, with a population estimated at 10,000,000, is inhabited by a variety of nationalities, generally spoken of as Afghans, though properly only the Durani, one of the two dominant tribes, are Afghans. The other principal races are the Ghilzai, Hazaras, Tadzhiks, Uzbeks, Aimaks, and the Kafirs of the Hindu Kush. The languages are Persian, spoken by a large part of the non-Afghans,



1 Party of Baluchis from the Bolan Pass, bargaining in Quetta 2 Group of Brahuis, hill people of the southern frontier 3 Camel train in the Khyber Pass a formidable dchle 33 miles in length

on the Indo-Afghan frontier. 4 One of five colossal statues of Buddha in the Bamian Valley, between Kabul and Turkistan, they are carved out of the solid rock 5 Street in old Kabul

and Pushtu. Their religion is Mahomedan, chiefly of the Sunni sect. Until the creation of Pakistan, Afghanistan was, after Turkey, the most powerful Muslim state. Such education as exists is supplied by the village mullah or priest.

The Afghans as a rule form small village communities, but there are certain towns noted in history, or of importance as strategic points. The principal are Kabul, the capital, 6,396 ft. above sea level, in the E.; Herat, the chief town in the W.; Kandahar, the chief city in the S.; and Mazar-i-Sharif, Ghazni, Jalalabad, Kun-

good roads, and the strategic importance of the mountain passes, together with the fact that the warlike clansmen are armed with modern rifles.

Afghanistan is divided into seven major provinces: Kabul, Mazar, Kandahar, Herat, Kataghan, Simat-i-Mashriqi, Simat-i-Junubi, and three minor provinces. Each is under a governor termed Naib or Hakim. All governors are responsible to the king, and the provinces are subdivided into districts under nobles and judges.

HISTORY. The Afghans of the Durani clan claim to be the Beni-Israel and descendants of the

Subuktijin the Turk conquered it, and established himself at Ghazni. His son, the famous Mahmud of Ghazni, invaded India, and conquered Lahore and Delhi. The hordes of Genghiz Khan, about 1220, and those of Timur, in 1398, overran Afghanistan and displaced the native dynasties. Baber, the Mogul emperor, is buried at Kabul. With the decline of the power of the Mogul court at Delhi, Afghanistan fell under the sway of Persia.

The modern history of the country dates from about 1747, when Ahmad Khan, a general of the Saddezzai family, seized Kandahar. With the extension of Russian power in Central Asia, and the growth of British influence in N.W. India, the position of Afghanistan became of great strategic importance. The ameers intrigued with the Russian and Indian governments, and in 1839, Dost Mahomed having entered into negotiations with Russia, Afghanistan was invaded by a large British force, and the ameer was sent as a prisoner to India. Thenceforward the relations of Afghanistan with India were dominated by one main consideration—the position of the country in view of a possible Russian invasion of India.

The British occupation of Kabul led to an insurrection in 1841, when Sir Alexander Burnes and his suite were assassinated. In the following Jan. the British army retreated from Kabul, and was completely annihilated with the exception of one survivor. Two British forces went to avenge the massacres, and Kabul was captured on Sept. 16, 1842.

Dost Mahomed, again called to rule the Afghans, proved a valuable British ally during the Indian Mutiny. He died in 1863, appointing Shere Ali, his third son, as successor. In 1878, Shere Ali having intrigued with Russia and declined to receive a British mission, a British force invaded Afghanistan. (See *Afghan Wars*.) Shere Ali retired to Balk, and died at Mazar-i-Sharif Feb. 21, 1879. By the treaty of Gandamak (May 26), it was agreed that Shere Ali's son, Yakub Khan, should be recognized as ameer, and that a British representative should reside at Kabul; and the extension of the British frontier by the occupation of the Khyber Pass and the Kurram and Pishin valleys was secured. Sir Louis Cavagnari proceeded as British resident to Kabul, but there



Afghanistan. The buffer state between Russia and Pakistan. It is mostly mountainous country broken by rocky ravines and fertile plains

duz, Balk, Maimana, Tash Kur-gan, and Faizabad.

Afghanistan is now a constitutional monarchy, with a parliament consisting of a senate (45 members nominated by the king) and a national assembly (138 elected members). The old title of ameer was discarded in favour of that of king in 1926. The nobles or chiefs are of three kinds: sirdars, khans, and mullahs. The sirdars are the hereditary nobility; the khans are the chosen representatives of the people; the mullahs are the Mahomedan priests and teachers. The revenue of the country is subject to marked fluctuations, and averages £4,600,000 per annum. The permanent army is stated to number about 90,000 men, but the force can be indefinitely expanded. The chief military strength of the country is its rugged and inhospitable nature, the absence of railways, or even

tribes carried out of Palestine into Media. Their language, however, does not support this claim. Before the Mahomedan invasions, Afghanistan was the centre of powerful Buddhist kingdoms. In the time of Darius Hystaspes, 515 B.C., it was included in the Achaemenian satrapies. Alexander the Great, in 329 B.C., crossed the mountains of the Paropamisus (Hindu Kush) and marched into Bactria, and in 327 he crossed the Indus, near the modern Attock, and invaded India. Many remains of Hellenic civilization are to be found in N. Afghanistan and in adjacent parts of Pakistan.

From the end of the 10th century, Afghanistan formed the principal highway of the Muslim invasion of India. The Hindu princes who had established themselves at Kabul were forced to abandon the country. In 977

on Sept. 3, 1879, he and his companions were assassinated.

The ameer, Yakub Khan, was forced to abdicate, and in July, 1880, Abd-ur-Rahman Khan, grandson of Dost Mahomed, was recognized as ameer. In the meantime, Ayub Khan, a brother of the late ameer, marched upon Kandahar, and on July 27, 1880, the battle of Maiwand (*v.r.*) occurred. Eventually, Ayub Khan, totally defeated, fled to Persia on Oct. 4, 1881, leaving Abd-ur-Rahman as the sole ruler of Afghanistan. Abd-ur-Rahman reigned until Oct. 1, 1901, when he was succeeded by his son Habibullah Khan. In the Anglo-Russian Treaty of 1907 Great Britain undertook not to annex Afghanistan and the Russian government declared the country to be beyond the sphere of Russian influence.

In 1915 the German government sent a mission to Afghanistan to incite the ameer to assist in liberating India. The ameer firmly refused the inducements held out to him to forsake his British ally. He was assassinated on Feb. 20, 1919, and the throne was seized by his brother, although the rightful heir was the eldest son of the former ameer. Even after the accession of Amanullah, third son of Habibullah, the country remained unsettled, and in May armed bodies of Afghans crossed the Indian frontier (*see* Afghan Wars). In 1929, Amanullah, whose western ideas were repugnant to his countrymen, abdicated in favour of his brother, Inayatullah Khan, who, however, was forced to abdicate. Habibullah, a brigand chieftain, seized the throne, but was subsequently defeated and executed by Nadir Khan, who became king. The latter was assassinated in 1933, when Mahomed Zahir Shah (b. 1914) succeeded his father Nadir.

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Afghan Wars. The extension of the British dominion in India, coupled with fears of Russian aggression, led to wars between Great Britain and Afghanistan in 1839-42 and 1878-9. A further war broke out in 1919.

In 1839 Great Britain decided to restore the ex-ameer, Shah Sujah, whose place on the throne had been taken by Dost Mahomed. Under Sir John Keane an army marched through the Bolan Pass, entered Kandahar, and saw Shah Sujah crowned. The only serious resistance came from the fortress of Ghazni, but on July 21 it was successfully stormed.

In 1841 seven British officers were murdered in Kabul, and on Jan. 6, 1842, the garrison, which included 8,000 Anglo-Indian troops, surrendered on condition that they were allowed to return to India. A treaty was signed and the retreat began. In a pass between Kabul and Jalalabad all the troops and their followers, 16,000 men, women, and children, were overwhelmed and murdered, one man alone, Dr. Brydon, escaping. The Afghans followed the way to India, but General Sale held Jalalabad against them. An Anglo-Indian army forced the Khyber Pass, relieved Jalalabad, and in Sept. occupied Kabul, where it was joined by a column from Kandahar, which the British garrison had refused to surrender. At the end of the year Afghanistan was evacuated.

Shere Ali and Russia

In 1875 the British Government, alarmed for the safety of the Indian frontier, requested Shere Ali, the ameer to allow a British agent to reside at Herat. After some negotiations he refused, and in July, 1878, signed a treaty placing Afghanistan under the protection of Russia. The viceroy sent a mission to Afghanistan, but this was not allowed to enter the country, and war followed.

In Nov., 1878, three Anglo-Indian armies took the field. One entered Kandahar; a second occupied Jalalabad; but the third, under Roberts, reaching Kuram without opposition, there found an army of Afghans in a formidable position on the Peiwar Kotal. Roberts led a force round the enemy's flank, and on Dec. 2 drove them in headlong flight. On May 26 the treaty of Gandamak granted the British demands.

On Sept. 3 following, Sir Louis Cavagnari, the British representative at Kabul, and his staff were murdered. Roberts, sent there at once with an army, defeated the Afghans and entered Kabul. He remained there for nearly a year, engaged in almost constant hostilities. In July, 1880 a British force met with disaster at Maiwand, near Kandahar, and there followed

the siege of the British garrison in that city. Roberts was ordered to avenge the loss, and with 10,000 men, marching over 300 miles in three weeks, he defeated the Afghan army outside Kandahar on Sept. 1. British prestige was restored, and Abd-ur-Rahman, the candidate favoured by the Anglo-Indian authorities, eventually became ameer.

In May, 1919, Amanullah Khan began a campaign against the British, his troops crossing the frontier at several points in the Khyber Pass district.

Having seized three points in the hills N. of the Khyber, the Afghans advanced to Ashrafi Khel, and threatened Landi Kotal. Sir Arthur Barrett, commanding the British forces on the frontier, drove the enemy from the neighbourhood on May 9, and marching into Afghan territory occupied Dakka Fort, 10 m. N.W. of Landi Kotal. On May 16 the Afghans attacked Dakka in force, but were repulsed. Next day they were again defeated on the hills W. of the fort. On May 21 Jalalabad and Kabul were bombed from the air. The Afghans started an offensive in the Tochi and Gomal valleys, and a force of 3,500 Afghans attacked Thal Fort in the Kurram Valley, but these efforts failed. Amanullah made overtures for peace; a conference was held on July 26 at Rawalpindi, and peace was concluded on Aug. 8, the ameer forfeiting the subsidy of £120,000 a year which the Indian government had previously paid.

Afmadu. Town in the former Italian Somaliland, 100 m. E. of the Kenya border. After severe bombing raids by the South African Air Force, the Italians evacuated the town on Feb. 10, 1941, and fled towards Kismayu. Afmadu was occupied by the King's African Rifles on Feb. 11.

A fortiori (Lat. from the stronger). Form of argument in which it is assumed that what has been found true or applicable to certain cases is with all the more reason true or applicable to the case under consideration. It may be thus expressed mathematically: if B is greater or less than C, and A is greater or less than B, much more then is A greater or less than C.

Afranins, LUCIUS (c. 100 B.C.). Roman comic dramatist. He wrote *comœdiæ togatæ*, comedies dealing with Roman manners, as contrasted with those of Plautus and Terence, whose plots were more or less taken from Greek sources. Fragments of his writings survive.

AFRICA: ITS LANDS, PEOPLES, AND HISTORY

EVANS LEWIN. Author of *A Geography of Africa*

This general article is introductory to others on separate aspects of the continent, e.g. Abyssinia, Congo, Egypt, Nile, Rhodesia, Sahara, South Africa, Zambesi. For African campaigns in the Second Great War see East Africa Campaign, North Africa Campaign, and articles on particular regions and towns

This great continent of the eastern hemisphere forms a S.W. extension of Asia, to which it is attached by the isthmus of Suez. It is of irregular triangular shape, with its base resting upon the Mediterranean and Red Sea and its apex at the junction of the Indian and Atlantic Oceans at Cape Agulhas, Cape Province of South Africa. From the northern point of Tunisia (Cape Blanco) to Cape Agulhas it stretches southwards about 5,000 m., and is divided into two almost equal parts by the Equator. The extreme W. and E. points are Cape Verde, in Senegal, and Cape Guardafui, on the coast of Somaliland at the entrance to the Gulf of Aden, about 4,000 m. apart. The total area of the continent is about 11,500,000 sq. m., and the estimated pop. is some 180,000,000.

GENERAL CHARACTERISTICS. With the exception of Australia, Africa is the most regularly shaped of the continents. With few exceptions there are no deep indentations into the coasts, and there are comparatively few bold headlands. The principal capes are Bon and Blanco (Tunisia). Sparte (Morocco). Verde (Senegal). Lopez (Gabun), Cape of Good Hope and Agulhas, and Guardafui; and the chief natural harbours are the Gambia estuary, Freetown (Sierra Leone), the Cameroons estuary, the mouth of the Congo, Lobito Bay (Angola), Walvis Bay (South-West Africa), Table Bay and Simon's Bay (False Bay); Delagoa, Mokambo, Momba, and Pemba Bays, in Portuguese East Africa; Kilwa, Dar-es-Salaam, and Tanga, in the former German colony of East Africa (Tanganyika), and Mombasa and Kilindini harbours, in Kenya. Long stretches of the coast have no natural openings, e.g. the greater part of South-

West Africa, and others are provided only with indifferent anchorages, e.g. Morocco to Cape Verde and the coast of Somaliland. Although about three times the size of Europe, the littoral is about 1,000 m. shorter.

The whole of Africa may be regarded as a vast plateau or inverted plate, at an average elevation of 1,300 ft. in the northern half and from 3,000 ft. to 3,500 ft. in the southern portion. Despite a certain general uniformity, the northern and southern portions of Africa present sufficient contrasts in their main physical conditions, ethnographical features, historical evolution, and general culture, to constitute two practically distinct regions. But there is no rigid partition between the two divisions, which are joined together, roughly speaking, by the Tibesti route across the Sahara, the low-lying valley of the Nile, and the Abyssinian massif, and divided by the great land-mass of the Sahara, the

Sudd regions of the Nile, and the desert-like country S. of Abyssinia.

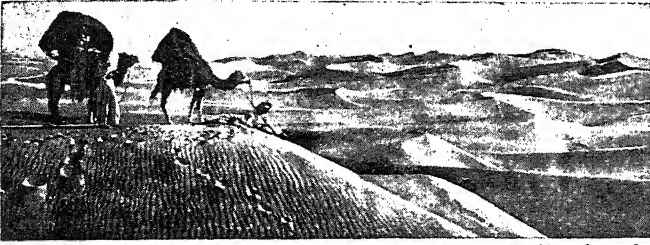
The mean elevation of the continent is considerably less than that of Asia, and its highest elevation is much inferior. The area of land above 10,000 ft. in height is insignificant, although about one-fifth of the continent lies 3,000 ft. above sea level. Orographically it may be divided into four regions: (1) the coastal plains, commencing with extensive mangrove swamps, or lagoons, as on the Gulf of Guinea, the coasts of Mozambique and old German East Africa, or sandy regions, as along the coasts of N.W. Africa from Mogador to Sierra Leone, the coasts of W. Africa from Benguela to Saldanha Bay, and the coasts of E. Africa from Mombasa to Suez, rising, generally gently, to the interior highlands; and the more abrupt coastlands of Algeria, Morocco, and S.E. Africa, with their backgrounds of considerable mountain groups; (2) the Atlas region of N. Africa; (3) the north and west African plains, including the Sahara; and (4) the great southern and eastern tablelands.

The Atlas region is a mountainous tract of land lying north of a valley-like depression which extends from the Gulf of Gabes, roughly, to the Rio de Oro. The north and west African plains may be considered to embrace the comparatively low-lying area south of the Atlas, and, stretching southwards across the continent, to include the basin of the Congo. This area includes three great desert regions. It is crossed from N.W. to S.E. by a series of elevated plateaux and mountain groups, including the Hoggar or Ahaggar massif.

In Western Africa the area is broken by elevated regions consisting of the Futa Jalon highlands and their offshoots,



Africa. Woman and children of Manica, Portuguese E. Africa



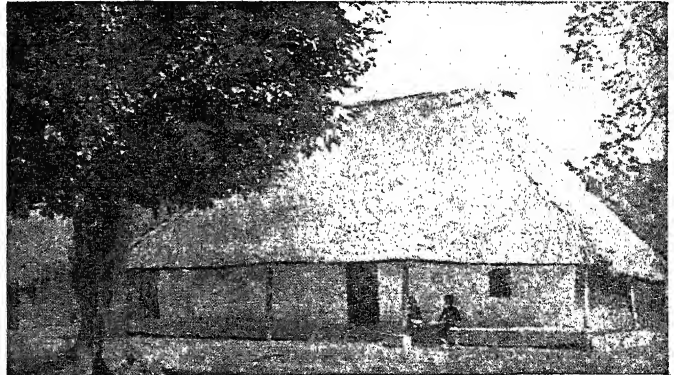
Africa. Arabs with their camels in the Tunisian desert. The ridges formed by wind-blown sand are clearly seen in the foreground

forming the hinterland of the West African colonies and extending, with breaks, through N. Nigeria to the mountainous region of Adamawa.

The fourth great division, consisting of the south-eastern tableland, has a greater mean elevation than any other portion of Africa. It stretches in a widening area from the Abyssinian highlands southwards, through the Great Lakes district, into southern Angola on the one side and Mozambique on the other, to the extremities of the Cape Province and Natal. The eastern portion has been modified by great rift valleys, starting from Lake Nyasa and branching east and west at a point north of the Abercorn portion of the Tanganyika plateau. The first of these depressions, the Eastern trough or rift valley, runs northward across old German East Africa and British East Africa to Lake Rudolf, and then turns N.E. to the Red Sea, which in reality itself forms a still larger rift valley and owes the straightness of its shores to this fact. The second, the Central African or Albertine rift valley, includes Lake Tanganyika, with its comparatively straight and high shores, and Lakes Kivu, Edward, and Albert, and terminates N. of the last lake and S. of the Nile. Volcanic action has been associated with the formation of these rifts.

Associated with these valleys are peaks E. of the Eastern trough,

such as Kilima-Njaro and Kenya, and the great ranges of Mfumbiro and Ruwenzori, the latter with heights of 16,800 ft., lying E. of the Albertine rift valley. Many of these mountains are still active volcanoes, especially those in the Mfumbiro range between Lakes Kivu and Edward. In the centre, between the two valleys, lies Lake



Africa. New style of native house built of wattle and daub in the Congo district. Healthier, cleaner and more comfortable than the old-style grass huts

Victoria. The descent from the central tablelands to the North African plains is abrupt, the Somerset Nile descending in about 90 m., over the Ripon and Murchison Falls, from 3,800 ft. to 2,400 ft. Southwards the central tableland becomes highest in its southern and south-eastern regions, where it culminates in the

Drakensberg Mountains, which form a N.E. extension of the mountains rising behind Cape Town. This South African tableland slopes gently to the west, but more abruptly on the eastern side, especially in Natal. There are heights of 10,360 ft. (Mont-aux-Sources).

The main mountain buttress in South Africa runs, like the coast, in a semicircle. At the N.W. end of the Cape province it is called the Kamiesberg and rises to over 5,000 ft. It is then continued in a S.E. direction as the Langeberg, Kamiskow, and Bokkeveld Mts. This system then turns and runs E. as the Roggeveld, Komsberg, and Nieuwveld Mts., and then bearing N.E. continues as the Sneeuwberg and Stormberg ranges until it merges in the Drakensberg Mountains

RIVERS AND LAKES. Africa is mainly drained to the west and north, or towards the Atlantic and Mediterranean. Eliminating the Sahara Desert, about two-thirds of the continent drains towards the Atlantic. The rivers may be divided into four main systems, as follows:

(1) Those that flow into the Mediterranean. With the exception of the Nile, all these rivers are short and unnavigable, the principal being the rapid Medjerda, which drains Tunisia. Certain other rivers, such as the Igharghar, which at one time flowed from the Hoggar region of the Sahara, have either dried up or remain as intermittent streams. The Nile (3,500 m. long) issues from Lake Victoria and forms the main drainage system of the Ruanda, Uganda, and Abyssinian regions. The Blue Nile rises in the Abyssinian highlands.

(2) Rivers flowing into the Atlantic. Many extensive rivers, north and west of the Niger delta,



Africa. Part of a convoy of natives bearing elephants' tusks, the raw material of the ivory of commerce. African ivory is regarded as the best

flow into the Atlantic, including the Gambia and the Senegal. The Niger forms the great drainage system of Western Africa, and, receiving many tributaries, such as the Kaduna and Benue, enters the Gulf of Guinea in Southern Nigeria, after a circuitous course of some 2,000 m from the high lands of Futa Jalon. The Congo the principal river of Africa, with a drainage area of about 1,425,000 sq m, only inferior to that of the Amazon, drains with its great tributaries the Ubangi, Kasai, Lomami, etc., the greater part of Central Africa, including Lake Tanganyika and the regions E thereof as far as Labora, and Lakes Mwari and Bangweulu. Other rivers flowing into the Atlantic S of the Congo are the Kwanza, Kunene, and Orange river (receiving the Vaal and other rivers draining from the Drakensberg), and N of the Congo, the Sanaga, Nyong, Ogowe, Nyanga and Kuilu.

(3) Rivers flowing into the Indian Ocean. The principal rivers draining into the Indian Ocean are the Limpopo, Sabi, Zambezi, Rovuma, Rufiji, Tana, and Juba. Of these by far the most important is the Zambezi, which drains the greater part of Rhodesia and portions of southern Angola, and the Nyasa region by the Shire affluent of Lake Nyasa.

(4) Inland drainage. In addition to the rivers entering the sea there are others either (a) draining into lakes or (b) losing themselves in the sand, such as the Gash river in the Kassala district of the Anglo-Egyptian Sudan. Of the former the principal are the Shari

with its tributary the Logone, which flows into Lake Chad, and certain rivers flowing into Lake Ngami. In the case of rivers with no exits, underground water supplies are formed, which by means of artesian wells are brought to the surface, as in the Wad Rhir



Africa. African boys, in their simple attire, and one of their village wine jars

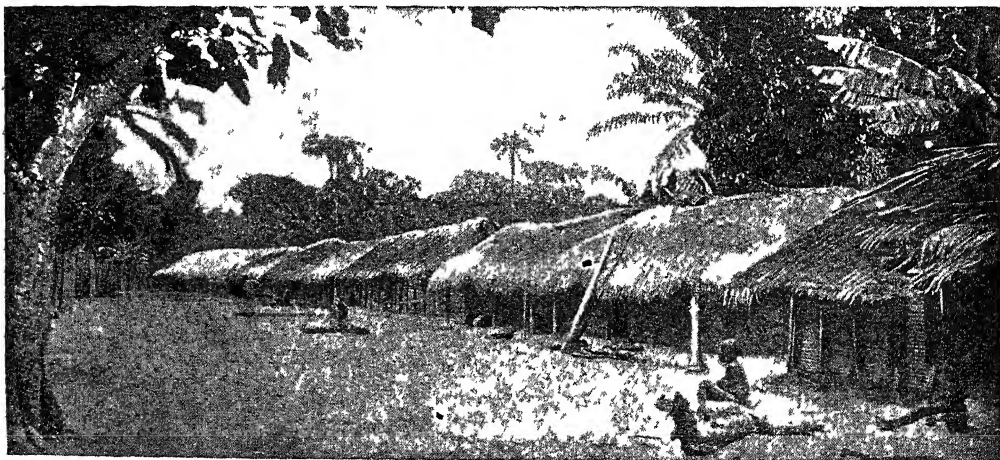
region of Algeria. It is probable that vast underground supplies of water exist in many parts.

The interior lake system is only inferior to the North American system. In addition to the great lakes, such as Victoria, Albert, Edward, Kivu, Tanganyika, and Nyasa, of East Central Africa, there are numerous other lakes, with fresh or brackish water, such as Bangweulu and Mwari in north-eastern Rhodesia, Rukwa in old German East Africa, Leopold II and Tumba in the Belgian Congo, Rudolf and Stephanie, and the so-called Lake Magadi, with extensive soda deposits in British

East Africa, and Lakes Chad and Ngami, the last being now mainly an immense swamp. In addition there are extensive depressions, such as the Lorian swamp in British East Africa, the Okavango swamps, the Lake No and Sudd regions of the Nile, which after rains become great swamps.

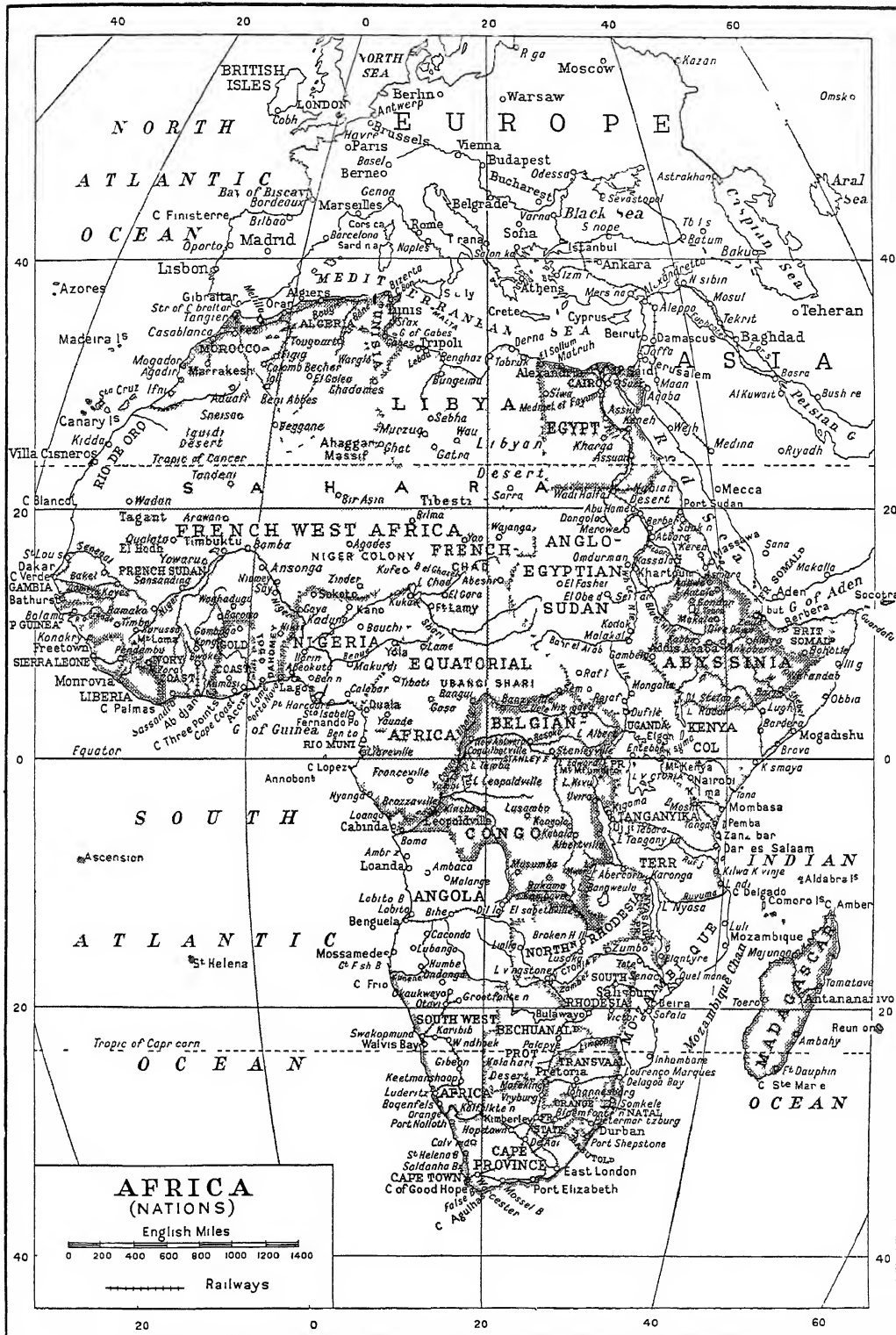
DESERTS In historical times great portions of Northern Africa, which were capable of producing vast quantities of cereals in the Phœnician and Roman periods, have dried up. This is especially the case where Semitic invasions have swept over the country, entailing the destruction of forests. Where the original population (Berber) has largely survived, as in Morocco, the process of destruction has been arrested in part. In South Africa, even during the past century, there has been a distinct increase of arid country, such as in the Ngami region, which in Livingstone's time was well watered. The Zambezi itself has probably a less volume of water than when it was first discovered by the Portuguese. The level of certain rivers, such as the Shire, has fallen, and it is probable that the level of some of the great lakes, e.g. Nyasa, has been affected within historical times. The principal deserts are the Sahara, Libyan, and Nubian, in reality one great system, and in the south the Kalahari, the remains of a great inland sea, with a desert area of some 275,000 sq m.

FLORA In the north the Mediterranean flora predominates. In many respects the Atlas regions form part of the South European botanical zone. Plants which can

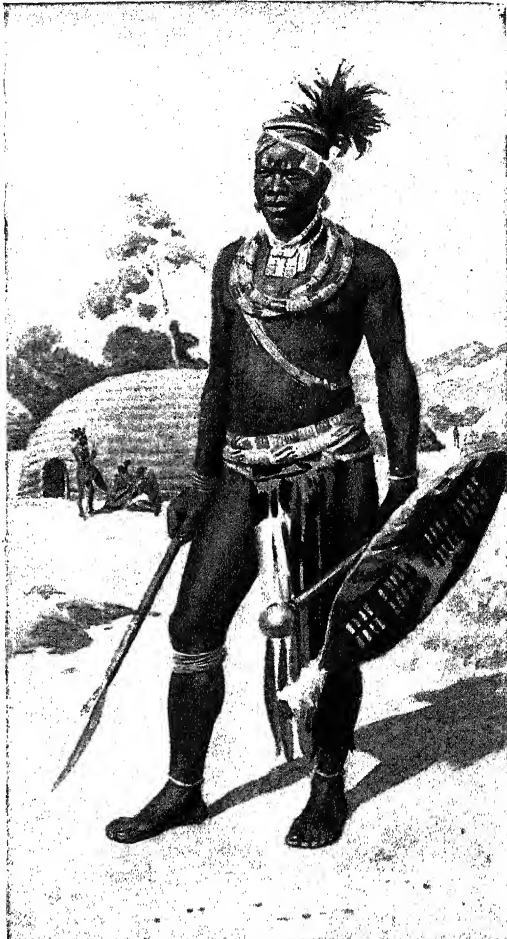


Village street in Moussembe, in the Congo country. All of the dwellings shown were the property of one man, indeed were his multiple home, for in each of the huts he kept a wife. Each fresh marriage entailed the building of a new dwelling as however many a man's wives were two were not kept in one house.

AFRICA. THE MANY HOMES OF A MUCH-MARRIED NATIVE OF THE CONGO COUNTRY

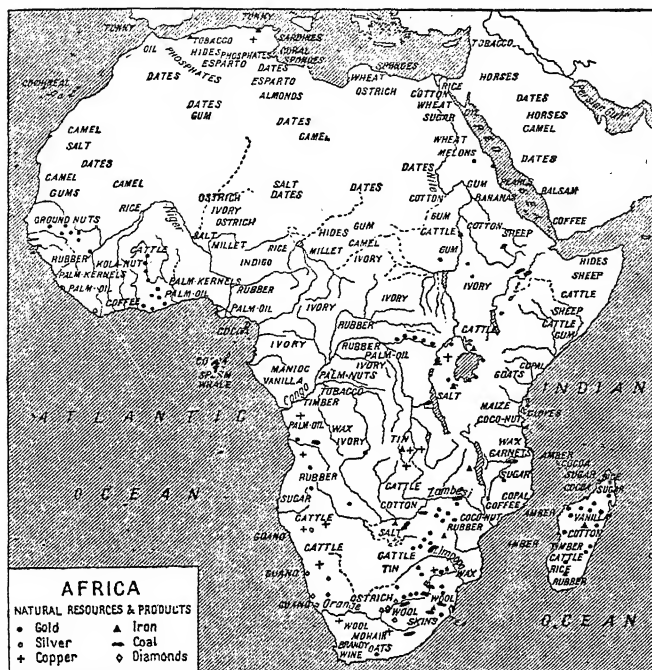


Fuller details will be found on the larger scale maps of the different countries—e.g. Egypt



1. Bushman of South Africa, one of the most primitive people of the continent. 2. Warrior of the Zulus, the most powerful Kaffir group. 3. Masai warrior of Equatorial East Africa, of Negro-Hamitic stock. 4. Ethiopian, one of the later people of Asiatic origin to penetrate into Africa

AFRICA: TYPES OF FOUR OF THE PRINCIPAL NATIVE RACES



Africa. Characteristic products are gold and diamonds, respectively about 1-4 and 4-5 of the world's output; rubber, palm oil, ivory, ostrich feathers, dates and cotton

obtain moisture at a great depth, e.g. the vine, karoo bush, and alfalfa or esparto, flourish. The last is exported in great quantities from Algeria. The olive, laurel, citron, orange, almond, fig-tree, white poplar, lime, myrtle, aloe, oleander, cork, and varieties of the oak are characteristic; but there is also an intermingling of tropical and subtropical forms. In the southern oases the date-palm attains its greatest perfection, especially in the Taflet region, and tropical elements predominate south of the Atlas. Forest vegetation has largely disappeared from Algeria and Tunisia, but there still are extensive forests in Morocco, where the trees have a close affinity with the Iberian flora and include evergreen oaks, the sanobar, carob, cedar, and acacia. Farther south the mimosa flourishes. Cereals of all kinds can be grown. Beyond the northern botanical zone occurs the highly specialised flora of the Sahara, with mimosa, acacias, and tamarisks along the wadi (river beds) where moisture lingers, and tamarinds on the slopes of the Hoggar and other mountains. In the extreme south of Nubia the baobab begins to appear.

West Africa is the habitat of the various rubber-yielding lianas, ground-nuts, and other economic plants. The oil-palm (*Elaeis guineensis*) flourishes in the upper

coastal regions, and mahogany and ebony in the coastal forests, as well as the bamboo-palm (*Raphia vinifera*), the bombax or silk-cotton tree, and teak. Farther north the grass and scrub lands of the Sudan afford pasturage for flocks and herds, as they do in the drier regions of southern Africa. Tropical forests cover the coastal belts of tropical Africa and much of the basin of the Congo. The trees are evergreen and often form an impenetrable cover. The great Ituri forests, west of the Semliki river, cover an immense area in the Belgian Congo. Uganda, British East Africa, Cameroons, etc., also have great forests, where cedar (*Juniperus procera*) and the Ibean camphor (*Ocotea usambarensis*) grow to an enormous size.

Woods and Flowering Plants

South Africa is largely destitute of forest, although extensive areas of various yellow-woods and stink-wood occur. The tropical flora of the central regions gives place in the semi-desert districts to fleshy leafless mesembryanthemums, aloes, and other succulent plants, and to the curious tree-euphorbias. On the veld there is a great variety of beautiful flowering plants. In Portuguese East Africa and Angola the vegetation is extremely prolific. In Angola landolphas,

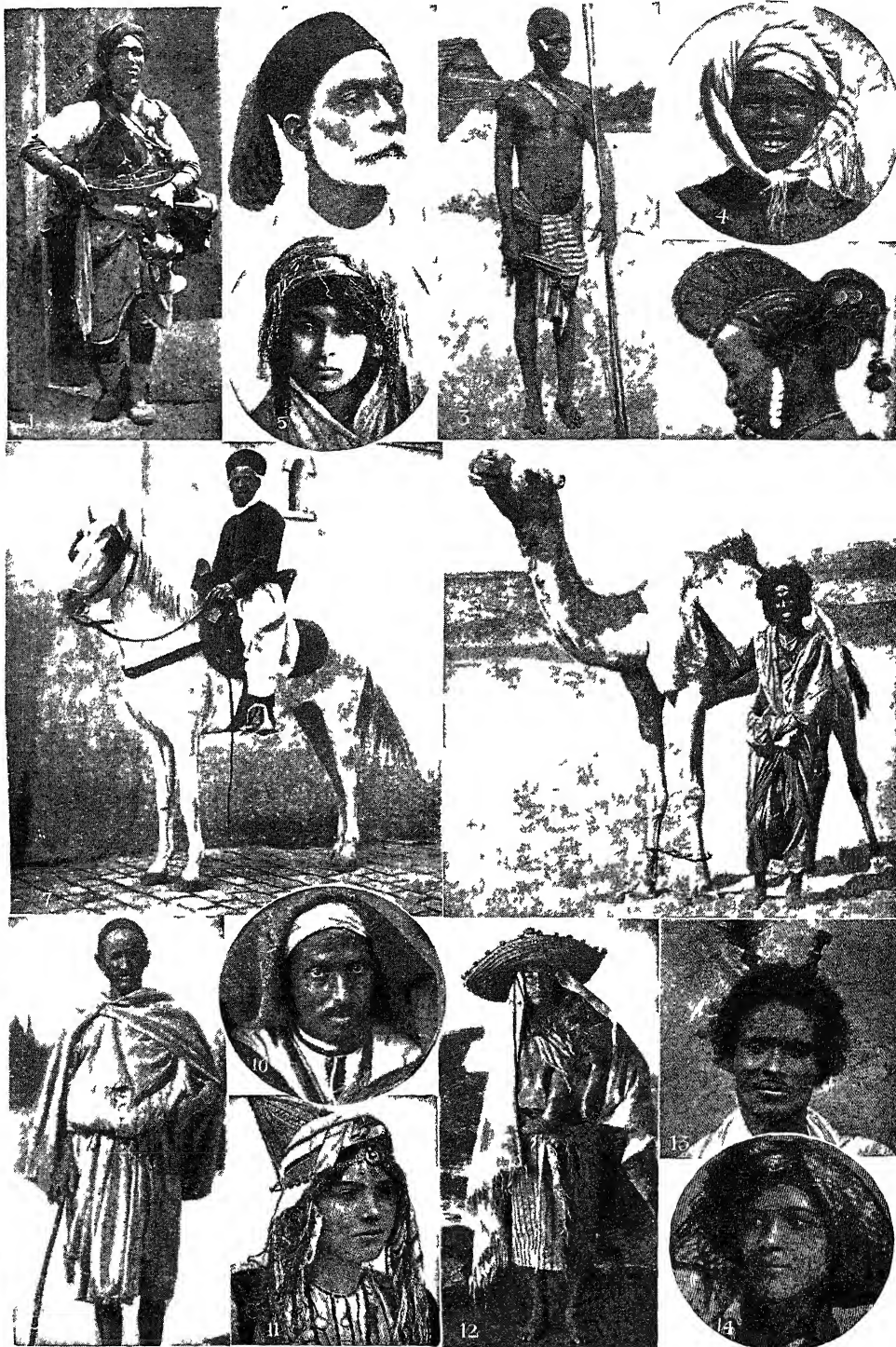
the mafureira (*Trichilia emetica*), and other economic trees and plants flourish. Sisal and many other fibres do extremely well in eastern Africa generally. In addition to the usual economic plants of Africa, such as cotton, tobacco, coffee (which flourishes in Abyssinia, British East Africa, and Nyasaland), bananas, and most other tropical plants known to commerce, there is an alpine vegetation on the higher peaks of East Africa, Abyssinia, and Cameroons, where some of the plants resemble those of the higher slopes of the Swiss Alps.

FAUNA. North of the Sahara the fauna is largely common with that of Europe and northern Asia. South of it is the African fauna proper. Here the open plains are the home of the antelope, giraffe, buffalo, zebra, wild ass, rhinoceros, and lion, leopard, and hyaena; although some of these also occur in the north of Africa. The African elephant wanders in both savannahs and forest regions. In the south it is still found in the Knysna and Addo districts of the Cape Province, where it is protected, but it is practically extinct south of the Zambezi. Bears, wolves, and foxes are confined to North Africa.

Introduction of Game Laws

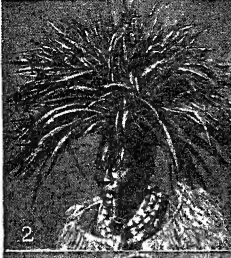
The chimpanzee and gorilla occur in the forests of Western Equatorial Africa. Baboons are, with a few exceptions, peculiar to Africa, and the single-humped camel is found in the northern deserts and steppes. The okapi and giraffe are indigenous. The former exists in the Semliki forests, and the latter is most common in the southern Sudan, Somaliland, and British East Africa, although it is also found in the Kalahari Desert and in the north of the Transvaal and Matabeleland. The hippopotamus and crocodile abound in the tropical rivers. Until recently the former was found in the rivers of South Africa. Game laws have been enacted, and extensive game preserves prevent the extermination of the rarer species.

MINERALS. Apart from native manufacture, iron ore is chiefly worked in Algeria, where there is a large export from the Mokta-el-Hadid mines. Gold is found over extremely wide districts, ranging from the Gold Coast and Ashanti to the great gold deposits of the Witwatersrand, in the Transvaal, where extensive coalfields also occur. In addition there are many important deposits in other parts of Africa, notably in the Kilo and Moto areas in the N.E. of the



1 Seller of sweet waters, Cairo 2 High class Egyptian Arab 3 Typical Boshu of the Congo 4 Sudanese donkey boy, Egypt 5 Native Beauty of Tripoli 6 Fula woman of French Guinea 7 Algerian Spahi 8 Bisharin of East Africa with camel 9 Kabyle tribesman Algeria 10 A typical Moor 11 Woman of Oran, Algeria 12 A Kabyle woman and child, Morocco 13 Man of the Esa Somali 14 A Moorish girl

AFRICA MEN AND WOMEN CHIEFLY FROM THE RACES OF THE NORTH



1 Tunisian woman 2 Swazi warrior South Africa 3 South African native in full dress 4 Chief of Mpororo E. Africa a pure Hamitic type resembling the ancient Egyptians 5 Masai warrior E. Africa 6 Zulu warrior 7 Dahomeyan warrior 8 Kafir postman Mozambique 9 Chief of Wukari Nigeria 10 Negro children Tripoli 11 Galla woman E. Abyssinia 12 Typical Abyssinian 13 Woman in mourning costume of grass Central Africa 14 and 15 Mandingo girls Sierra Leone 16 Young warrior Somaliland

AFRICA BARBARIC DRESS AND DECORATIONS OF DIVERSE PEOPLES

Belgian Congo and in the goldfields of Mashonaland and Manicaland. Diamonds are found chiefly around Kimberley, E. of Pretoria, in the Orange Free State, and in South-West Africa around Angra P. quena (Lüderitz Bay).

Copper and Coal Workings

Immense deposits of copper occur in the Katanga regions of the Belgian Congo, and it is also worked in Namaqualand near Port Nolloth, in the north of the South-West Africa Protectorate at the Otavi mines, in the north of the Transvaal at Messina, in the Victoria district of Rhodesia, and many other places. Coal is worked in Natal, in the Transvaal, at Wankie in Rhodesia, and at the Udi coalfields in Nigeria, and large deposits have been located in Katanga and elsewhere. Phosphates are exported extensively from Tunisia and Algeria. Abyssinia is highly mineralised.

COMMUNICATIONS. Until comparatively recent times communications in Africa have been mainly by means of caravans of porters from inland places to settlements on the coasts and vice versa, and by navigation along the great interior waterways. Caravans are still necessary in partially developed regions in order to bring produce to the nearest railway centre (e.g. Cameroons, Belgian Congo, etc.). Railways were first established in Egypt (1856), Algeria (1857) and Cape Colony (1859). There are three main gauges on the African railways—the Cape gauge (3 ft. 6 ins.) of the South African, Sudan, Nigerian, Ben-guella, and other railways; the metre gauge (3 ft. 3½ ins.) of the French colonial railways, the Uganda Railway, etc.; and the standard European gauge (4 ft 8½ ins.) of many of the Algerian and some of the Egyptian railways.

After the year 1880 very extensive developments took place in railway construction. The new era of communication was heralded by the commencement of the Kayes-Niger Railway in 1881, and the construction of the Lower Congo Railway (1890), joining the navigable sections of the lower and middle Congo river and providing an outlet for the immense territories of the Congo basin. There were in 1939 at least twenty main lines of railway communication: (1) Cape Town to Bukama, in the Belgian Congo, 2,598 miles, via Kimberley and Bulawayo; (2) Bulawayo to Beira, 676 miles; (3) Kimberley to Lourenço Marques, via Johannesburg, 703 miles; (4) Johannesburg to Durban, 482 miles; (5) Johannesburg to Port

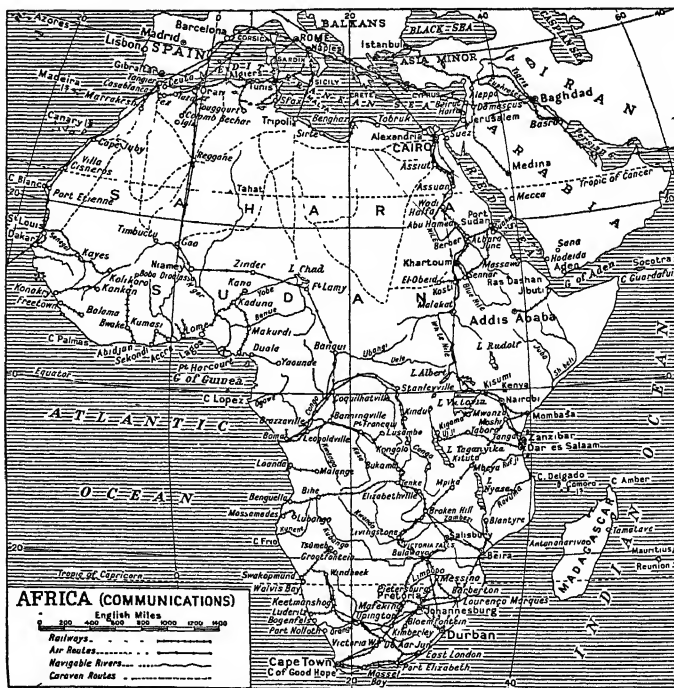
Elizabeth and East London, 712 and 665 miles respectively; (6) Dar-es-Salaam to Kigoma, on Lake Tanganyika, 780 miles; (7) Mombasa to Kisumu, on Lake Victoria, 584 miles; (8) Jibuti to Addis Ababa, in Abyssinia, 490 miles; (9) Port Sudan to Atbara Junction, 299 miles; (10) Wadi Halfa to El Obeid, via Khartoum and Sennar, 1,618 miles; (11) Alexandria to Shellal, via Cairo, 555 miles; (12) Tunis to the Moroccan frontier, 1,312 miles; (13) Philippeville to Touggourt, via Constantine, 337 miles; (14) Oran to Colomb Bechar, 465 miles; (15) Casablanca to Fez, via Rabat, 208 miles; (16) Dakar to Kayes, on the Senegal river, to run over 468 miles; (17) Kayes to Kolikoro, on the Niger, 343 miles; (18) Konakry to Kankan, 411 miles; (19) Lagos to Kano, 704 miles; (20) Walvis Bay to Cape Town, via De Aar, 1,635 miles.

Other railways have been constructed in Sierra Leone, Ivory Coast, Gold Coast, Togoland, Dahomé, Cameroons, Belgian Congo, Portuguese West Africa, Portuguese East Africa, Nyasaland, Tanganyika, and Uganda, while the important railway from Lobito Bay to Katanga provides a rail and water route across Africa from West to East, and also links with the Cape-Congo railway at

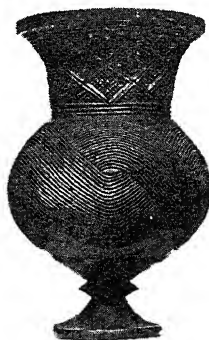
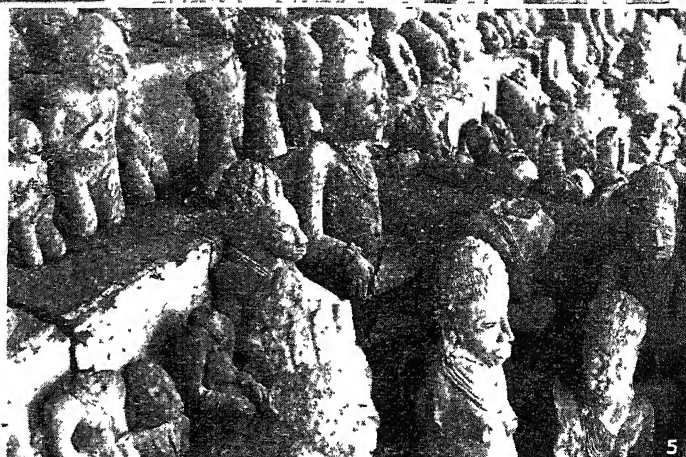
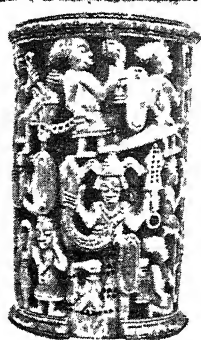
Tenke, 1,122 miles from Lobito Bay, 176 miles N. of Elizabethville, and 2,481 miles from Cape Town. This line is of great importance in the development of Katanga. A railway from Bene to Lake Nyasa crosses the Zambesi at Sena. Numerous other railways have been planned, the most important being (1) a Trans-Saharan railway from the coast of Algeria towards Konakry and Dakar in the one direction, and Lake Chad and the Congo regions in the other; (2) from Kafue to Salisbury in Rhodesia, shortening the route from Katanga to Beira by 587 miles; (3) from Porto Amelia to Lake Nyasa; (4) from Stanleyville to Lake Albert, giving direct communication between the Congo and the Nile. The so-called Cape to Cairo route, suggested by Cecil Rhodes, runs from south to north across Africa, but through railway connexion has not been completed.

Linking Waterways and Railways

An important problem of the future is the provision of adequate inter-communication between the navigable waterways and the railways. Many of the larger rivers of Africa are navigable for small steamers and launches over hundreds of miles (e.g. the Nile, Niger, Congo, Zambezi), but are broken into sections by rapids,



African Communications. Modern developments in railway, air, and other routes



1. Ivory armlet from Benin, Nigeria. 2. Ivory figure of a horseman; Gold Coast. 3. Trumpeter of the Mangbetu court, holding an old imperial horn carved from an elephant's tusk; Belgian Congo. 4. Modern sculpture in wood by B. C. Enwonwu; Nigeria.

5. Stone figures discovered in 1934 at Esie, Nigeria. 6. Carved stationary war drum from Benin; drumhead of leopard's skin. 7. Wooden vase; Bakongo tribe, Belgian Congo. 8. Bronze head excavated in 1938 at Ife, Nigeria. 9. Ashanti gold weights in bronze.

AFRICA: EXAMPLES OF HANDICRAFT COLLECTED FROM AMONG ITS PRIMITIVE PEOPLES

1, 2, and 7, British Museum; 3, American Museum of Natural History; 4, photo Maigot Lubinski; 5 and 8, courtesy of Mr. E. H. Duckworth, Editor of "Nigeria"; 9, Pitt Rivers Museum, Oxford



Africa The map shows the uniform plateau relief of the continent S of the Equator, the vast expanse of desert, and the almost unbroken coast line which impede traffic. There is steam navigation on the larger lakes, such as Victoria, Albert, Tanganyika, Nyasa and Mweru. Telegraphic communication from north to south is maintained via the Transcontinental line.

Africa is traversed by air routes from Cairo to South Africa and others in Western and Southern Africa. There is an important air route from Lisbon to Leopoldville, in the Belgian Congo, and thence to Cape Town.

LANGUAGES The languages of Africa may be grouped in the main under four heads: Bantu, Sudanic, Hamitic, and Semitic. The Bushmen and perhaps the pygmies have their own languages, of which little is known. Bantu and Sudanic are both negro language groups. Phonetically the former is distinguished by the simplicity and melodiousness of its vowels syntactically by its use of prefixes to indicate concords; the latter feature it shares with the semi-Bantu groups of Sudanic languages. Phonetically negro languages are usually distinguished by the importance of the tone (musical pitch) of a word.

The characteristics of Bantu and Sudanic languages can best be illustrated by a series of sentences translating our (1) good (2) woman (3) is working (4) Bantu *umfazi (3) wetu (1) omuhle (2) mya sebenza (4)* Timne *wunibon osu ofino o ; o mpant*

beings are the two Bantu classes which refer to human beings. The Bantu concord system is clear if the example above is compared with the plural form *abafazi betu abahle bayasebenza*.

Wolof belongs to a second order of language which has classes but no prefixes, and indicates the relations of words by the consonant prefixed to the *u* or other vowel of the particle, which is *d'* in the above instance in assonance with *d'igen*. The only change in the plural would be *yu* instead of *d'u*. Ibo has no concords and virtually no plural forms; the sentence can be made plural by inserting *obutu* (many) or *ja* (they). Hausa, which is perhaps an Hamitic language, has feminine forms, many plurals but no classes.

Some Sudanic languages are almost monosyllabic, like Boko, or if not monosyllabic, the words are made up of other words, each of which has its own meaning. At a stage beyond this—agglutinating—words are made up of roots and affixes; the latter cannot now be used alone, but may still be traced at times to originally independent words. Both in Bantu and Hamitic languages inflexions and internal changes are used to modify the meaning.

A third mode of classifying languages, applicable more especially to Sudanic tongues, is by their vocabulary. These languages may be grouped or classified according as they are, like Kru, now evolving classes, or, like Timne, have them fully developed, or, like Ibo, have had them and lost them. This gives us, geographically, fifteen or more groups, and formally, six or seven classes.

Ranging these geographical groups according to their syntax and vocabularies, we get (a) the West Sudanese including Kru,



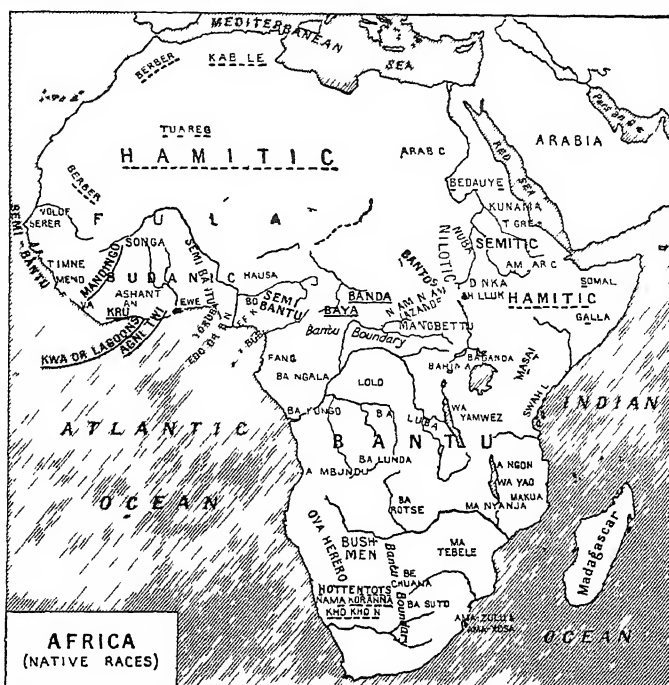
Africa Scene in a typical market place in British Central Africa, indicating something of the mixture of races that meet there

Mandingo Kwa, and Niger Chad, (b) semi Bantu, including the Atlantic coast tribes, peoples of the Volta river, Benue and Togoland, (c) Old semi Bantu, in Adamawa and on the Ubangi river, and (d) the middle Sudan group, which in the east includes Nilotic tribes closely allied in language to the Hamites. This system, however, disregards the history of the languages, and must be regarded as provisional.

The main characteristic of Hamitic languages is the use of gender in a sense nearly the same as in Indo European languages. In negro and Bantu it is common to distinguish human and non human, great and small, living and non living, but the Hamites commonly make sex the basis of distinction, though in Masai we find long grass is masculine, short grass feminine. It has been suggested that our notion of gender was originally based on the distinction of large (male) and small (female), and that Masai is a transitional language. Other features of the Hamitic languages are the use of suffixes, also found in negro languages, and inflexions proper, also in Bantu. They share with Bantu and some negro languages the use of many verbal forms, causative, inchoative, etc., distinguished by suffixes, and of tense distinctions dependent less on past, present, or future than on the completeness or incompleteness of the action. Owing to the influence of neighbouring tongues a language may pass from one group or one family to another, and in the transition stage its real position cannot be discovered.

The Bushmen of South Africa have their own languages, remarkable for the use of "clicks," sounds produced by the tongue, but their relations to other African languages are not determined. The pygmies of the equatorial zone speak Bantu or Sudanic languages.

The Fula language is spoken by



Eastern or Central Africa to the very extremity of the continent.

The Bushman and the Negro sub-species of man may have arisen in Asia, if not within the limits of the Mediterranean basin. From some focus in Southern Asia they migrated through Syria into Egypt and North Africa, and in another direction overspread India, Indo-China, Malaysia, and Oceania, even in a generalised form penetrating through Australia into Tasmania.

To some extent the negroid or negro type pervaded Southern Europe, and it certainly inhabited at one time the delta of the Nile. But with many fluctuations the Northern types of man could never leave Africa alone.

By about 20,000 to 10,000 years ago they had become the dominant race in North Africa, and had even penetrated to the Canary Islands. They must have pushed down either along the Atlantic coast of the Sahara Desert or across the Tibesti plateau-bridge into tropical Africa, and there have laid the foundations of the remarkable Fula cattle-keeping aristocracy. The Fulas invaded Egypt from the west, drove out, enslaved, or exterminated the dwarfish negro tribes, mingled in Ethiopia with those negroes and Bushmen whom they could not conquer, and produced an amalgam with contributions from Arabia, which we now know as the Hamitic race.

The white man from the north, again, colonised Asia Minor, Syria, Arabia, Persia, and Northern India. In Syria and Arabia, no doubt, he absorbed many pre-existing tribes of darker skin-colour and inferior physique. From Arabia, however, came across the Red Sea army after army of more or less Semitic people, seeking for a new home with a sufficiently abundant water supply. They first fused with the Hamites in the north of Abyssinia and the Red Sea coastlands, then took possession of the valley of the Nile, and by degrees extended their sway to its delta, and became what we know as the Ancient Egyptians, fusing to a great extent with the prior Libyan or Berber settlers from the west.

Foundation of Ancient Egypt

The civilized Egypt that was thus founded between 10,000 and 7,000 years ago had an immense effect on the subsequent history of Negro Africa. From Egypt there penetrated by degrees many of the inventions and the improvements of Neolithic Man. These included the domestic animals and cultivated plants of Asia

which could take root in tropical Africa, ideas on religion, ideas as to the use of metals, musical instruments, games, legends, the arts of weaving and dyeing, well-nigh all the elements of such civilization as was found among the negroes when the Arabs came in the full tide of Mahomedan propaganda, or as the Portuguese discovered them in the 15th and 16th centuries. No doubt, also, there were many influences spreading into Africa from prehistoric Greece and Italy, and certainly by way of Carthage and through the empire of Rome.

It would seem, indeed, as though 3,000 to 4,000 years ago there had been a distinct push southwards from the Mediterranean (distinct from Egyptian influence) which carried some great wave of North African influence into Central Africa. One of the earliest of such movements as these seems to have created a series of remarkable languages in Nigeria: first, the great languages of prefix, suffix, and concord, such as the Fula, the



Africa. Negroes of ancient Nubia
Painting in an Egyptian tomb

Bantu, and the semi-Bantu, and, at a later date, the sex-denoting languages of Hamitic aspect, such as Hausa and Musgu, or the Nilotic and Bongo languages of the Eastern Sudan and Equatorial East Africa. When the enterprise of Carthage declined and Egypt fell under the sway of Europe or Asia, a fresh enterprise arose, as to which in its earliest form we have only vague surmises and deductions. This was the direct influence of Arabia on East Africa, perhaps the outcome of Phœnician voyages.

The races of Africa range from the well-proportioned and comparatively fair Hamitic peoples of the Eastern Sudan, with regular European features, and the black populations of the Western Sudan and the White Nile valley, to the Bushmen and Hottentots, and dwarfish races of certain portions of the Congo regions. There is great variety of races even in the same district. Tall, dark peoples, such as those of the Ubangi, Aruwimi, Semliki, and Kasai basins, dwell in close contact with tribes who have a mean height of not more than 51 ins.; and in many parts differing races are inextricably mixed.

In the north occur the Hamitic Berbers, Egyptians, and Ethiopians, who are predominately Mahomedan, the Semitic Arabs and Abyssinians. The former are Mahomedans, while the latter profess a barbaric form of Christianity derived from Christian missionaries before the advent of Mahomedanism in North Africa.

The Negroids of Western Africa

The negroid peoples of Western Africa are divided into hundreds of groups, speaking distinct languages with little affinity to each other, and comprise the Fulas, who are more Hamitic in their characteristics than their immediate neighbours. Linguistically the negroids of Western Africa are roughly divided from the so-called Bantu peoples by a line running from Cameroons (Rio-del-Rey) to Lake Albert. North of this line are the Negroes proper and south of it races speaking one or other of the Bantu languages. With the exception of the Hereros of South-West Africa, they are mainly agriculturists. In addition, the Bushmen, who are nomad hunters, occur in scattered groups in the south-west portions of Africa, having been driven there from the far north of Tanganyika. They are a feeble and disunited people, and are closely allied to the Hottentots, a Negroid-Hamitic race who have retired before the Kaffir incursions into South Africa. The chief and most powerful Kaffir group are the Zulus of south-eastern Africa.

ANCIENT HISTORY. As stated above, the continent of Africa was not isolated from Europe or Asia in past ages, as it was imagined to be, before the Arabs, the Norman-French, the Catalans, and the Portuguese explored its interior beyond the Sahara Desert, or revealed the outline of its coasts to the astonished and greedy world of the Italian Renaissance. Northern Africa, N. of the Sahara Desert, was in almost all times of human existence more mixed up with Europe and Western Asia in its human history and migrations of the human species and varieties than tropical Africa across the Sahara Desert.

Although traces of ancient civilization have been found in the S. of Africa, e.g. the remarkable ruins at Zimbabwe in Rhodesia, the early history of Africa is mainly concerned with the various states in the N. part of the continent. The earliest recorded history is that of the Egyptians. Later the Phœnicians made settlements

along the littoral, founding the city of Carthage about 800 years B.C. The ancient Greeks, to whom Africa was known as Libya, founded the city of Cyrene c. 630 B.C., and in 332 B.C. Alexander the Great founded the city of Alexandria on the site of an Egyptian town. When Carthage fell in 146 B.C. the Romans erected the territory into an imperial province under the name of Africa, and to this day the Arabs call Tunisia

Reinforced by Mahomedan Persians from Shiraz on the coast of the Persian Gulf, they established some remarkable city states on the equatorial east coast between the mouth of the Juba river and Mombasa. Their predecessors, as early as the 6th century after Christ, had already penetrated East Africa in this direction and gained some knowledge of the existence of the mighty snow-crowned volcanoes of Kilima Niaro

that was now Christian, and to England and Ireland under the Plantagenets, but discovered, or rediscovered, the Azores and the Canary Islands, and found their way past the Atlantic coast of Morocco, probably right round Guinea, into the vast bight of West Africa. As early as the 14th century it seems as if Norman sailing-ships from Dieppe had reached the Gold Coast. Mahomedan adventurers and missionaries from Egypt and North Africa had in the meantime penetrated through the basin of the Niger from Lake Chad to Senegambia, and had not only discovered the gold of Bambarra, but had come to hear of the gold to be found in Ashanti, a region known vaguely as Wangara. In their intercourse with the Normans, Catalans, and Portuguese, they spoke of these gold-bearing regions in West Africa. But it seems to have been a desire for ivory and pepper as much as for gold which attracted to the Gold Coast the ships of Dieppe.

In the 15th century the Portuguese outdid all predecessors by their African discoveries. The royal family of Portugal had not only reconquered all Portugal from the Moors, but had now commenced to wage war on the Moors in Morocco, and in the early part of the 15th century conquered the promontory of Ceuta. They next seized other ports on the Atlantic coast of Morocco, and sent their vessels to reach the lands of flowing rivers and abundant forests south of the Sahara Desert.

Early Portuguese Explorers

By about 1484 the Portuguese, greatly assisted by Venetian and other Italian sea-captains and pilots, had discovered the whole coast of West and South-West Africa. By 1487 they had rounded the Cape of Good Hope, and at the very termination of the 15th century had passed round South-East and East Africa to Arabia and India. During the 16th century Portugal made acquaintance with Somaliland, Abyssinia, and the Red Sea, conquered more or less and explored Western Congoland, revealed to European knowledge the great Congo river so far as it was navigable from the sea, the Cameroons Mountains, South Africa and the land of the Hottentots and Bushmen, Zululand and the stalwart Bantu Kaffirs, Sofala and the gold mines, the Lower Zambezi, Mozambique, Madagascar, Zanzibar, and Mombasa. They discovered the Negro kingdom of Mosi north of the Gold Coast and had even, it is believed, penetrated to Timbuktu.



Africa. Typical Bantu house, Equatorial lakes region. It is made of Raphia palm stalks, the spaces between which are filled with leaves. The roof is of dried grass

Afrikiyah or Ifrikiyah. Later the Romans absorbed N. Africa into their empire and applied the name Africa to the whole of the continent as then known. (See Egypt, Ethiopia, Carthage, Cyrene, Alexandria, Nubia, Rome, Greece, etc.)

Before the Christian era opened, the sailing-ships of South-West and South Arabia seem to have passed cautiously from one port and island to another down the East African coast, until at last they discovered and colonised the north end of Madagascar and the Comoro Islands. Thence it appears likely that these pre-Islamic Arabs reached the mouth of the Zambezi and discovered the alluvial gold in South-East Africa.

MODERN HISTORY. After the first commotion created by the teaching and preaching of Mahomet, the Mahomedan Arabs recommenced their voyages to East Africa, this time more for the purpose of the slave trade and the procuring of ivory or the search for gold. By the 10th century they were already established in little sultanates at points like Kilwa on the east coast, and had seemingly reopened the communications with the gold-bearing regions of Southern Zambezia through Sofala, which was situated close to the modern Beira.

and Kenya. The Islamic Arabs, however, between the 8th and 18th centuries, directed their East African explorations rather in the direction of the Zambezi and Lake Nyasa. For some reason they fought shy of penetrating Eastern Equatorial Africa.

The renaissance of Europe after the Crusades began the tremendous movement, which reached its culmination in our own day, of the European exploration of the Dark Continent. The Crusades directed the attention of English, French, German, and Italian adventurers to the coasts of Morocco, Tunis, Tripoli, and Egypt, and as early even as the 11th century strange stories began to reach France, England, and Italy concerning the wonders of tropical Africa, stories picked up from contact with Arabs, Berbers, and Egyptians. When the ardours of the Crusades abated, there was a Europeanised Mediterranean which was regaining over the world of Islam something of the ascendancy that Rome won over Carthage.

In the 13th century there were bold Catalan and Genoese navigators with greatly improved and more seaworthy ships, who not only found their way through the Straits of Gibraltar to the Portugal

In the 17th century Italians—encouraged by the popes—English and French traders or sea-captains, and Dutch soldiers, merchants, and colonists had taken up the romance of African exploration. In the 18th century the British had as explorers distanced all other European nations. They put much of Lower Egypt on the map. They rediscovered, under Bruce, the sources of the Blue Nile, and set forth the geography of Abyssinia. They explored Senegambia and the Niger delta, and finally, through Mungo Park, discovered the Upper Niger. Acting for the Dutch Company in the south, they revealed the existence of the Orange river and some important features of South African geography.

As soon as the 19th century opened, British explorers again distanced all other competitors. Mungo Park followed the Niger from its upper waters to the falls of Busa; and a succession of other English explorers not only traversed the Sahara Desert from Tripoli and discovered Lake Chad, but also revealed the river Benue and the Middle Niger, and traced the Niger to its outlets into the sea. During the 19th century the British had revealed the whole course of the Congo, the sources of the Nile, and the great tributaries of the Bahr-el-Ghazal. They had finally surveyed Abyssinia and much of Somaliland, and discovered Lake Tanganyika, the Victoria and Albert Nyanzas, Lakes Bangweulu and Mweru, and the whole course of the Zambezi from its source to its mouth, as well as the course of the Limpopo river and all the other great and small streams of South Africa, the snowy range of Ruwenzori and the high mountains of North and South Nyasaland. In the discovery of South-Central Africa the missionary explorer David Livingstone (*q.v.*) played a great part.

Discoveries in the 19th Century

The Germans and the French likewise played a considerable part in the revelation of African geography during the 19th century. The Italians also took a hand, and the Portuguese interest in African geography was revived and filled up many of the smaller blank spaces on the maps of their possessions. The Americans, of the United States, founded the freed slave republic of Liberia, and they discovered the gorilla in the Gabun and the remarkable Fang people of that region. In the latter part of the 19th century they assisted to lay bare the geo-

graphy of the great British Protectorate of Uganda.

In the opening years of the 20th century the French completed the map of the Sahara, so far, at any rate, as all important geographical features are concerned. The Germans, who had cooperated with Stanley and Grenfell, with Belgians and with Frenchmen, in mapping the Congo basin, devoted themselves, with very remarkable results from a scientific point of view, to the survey of their large

for a time in West Africa. Taking advantage of the war with Holland in Charles II's reign, the English seized some of the Gold Coast possessions of Holland and retained them, though the Dutch remained a colonial power on the Gold Coast until the middle of the 19th century. The French also, in the 17th century, laid claim to Madagascar and occupied the Mascarene Islands abandoned by the Dutch. The British as a counterpoise took possession



Africa. Bantu maiden of the Equatorial lakes region, making a mat. The watching woman is wearing the skin of a cow as a token that she is married

colonies and protectorates in South-West Africa, in East Africa, and in Western Equatorial Africa.

The first European nation to take political possession of any part of Africa was naturally the Portuguese. Beginning with Morocco, Portugal, by the close of the 16th century, had erected many forts at different points along the coast of Africa. So far as the rest of Europe was concerned, she virtually claimed a monopoly of the African coasts from the Senegal right round to Cape Guardafui. But the Dutch seized Portuguese islands off the coast of Senegal, took possession of all the Portuguese forts on the Gold Coast, and all but conquered Angola, whence they were subsequently expelled by a return of Portuguese power. They founded under the Dutch East India Company the colony of the Cape of Good Hope, and made determined efforts—eventually defeated—to replace the Portuguese in Mozambique.

The French founded trading settlements in the 17th century at the mouth of the Senegal; the British established themselves at the mouth of the Gambia, and the Brandenburs

of St. Helena and Ascension. In the 18th century the French tried intermittently to replace the Portuguese in Abyssinia and on the Lower Congo, but their efforts were balked by British influence. The French similarly aspired to take over Cape Colony from the Dutch, and balked the British from similar ambitions. Their most amazing effort to found an African empire was the conquest of Egypt by Napoleon Bonaparte.

In the course of the Napoleonic wars the French were compelled to abandon Egypt, and although that country reverted to the Turks, the future British protectorate was more or less founded at the beginning of the 19th century. The British took possession, once and for all, of Dutch South Africa, and step by step extended the small Dutch colony of the Cape, until their flag waved at last over the whole of Trans-Zambezi Africa, save the Portuguese possessions on the east coast. The French, however, invaded and conquered Algeria. In the last half of the 19th century they added Tunis as a protectorate, and their small trading colony of Senegal grew into their gigantic empire over Western and North-

Western Africa, which now includes the greater part of Morocco, the whole of Algeria and Tunis, and extends to Lake Chad and Cameroons, to the middle Niger and to Dahomé, to the Ivory Coast and Guinea. At the end of the 19th century they had conquered Madagascar and had entered, explored, and annexed the Gabun and the N. Congo basin.

German explorers came to Africa at first more or less in the pay of the British government, or as missionaries affiliated to British missionary societies. They crossed the Sahara Desert and added greatly to our knowledge of Nigeria. They explored the Congo basin and South Africa. German missionaries discovered the snowy mountains of Kenya and Kilimanjaro, and played a considerable part in the opening up of the Nile valley. By the eighties of the 19th century the colonial movement for founding German possessions in Africa grew too strong for the German government to resist, and there were brought into existence between 1884 and 1890 a small protectorate over Western Dahomé (Togoland), a large protectorate between Lake Chad and Cameroons, and the huge colonies of South-West Africa and East Africa.

The Treaty of Versailles, 1919, deprived Germany of all her African possessions. Great Britain, France, and Belgium were appointed to act as mandatories of the League of Nations. Togoland was apportioned between Great Britain and France. About four-fifths of Cameroons were allotted to France, the remainder to Great Britain. S.W. Africa was placed under the administration of the Union of S. Africa, and German East Africa was divided between Great Britain and Belgium.

Italian Adventure

Both before and after German movements Italy's aspirations for an Italian Africa began. She commenced to take a definite interest in Tripoli when she was disappointed of Tunis, and in the opening years of the 20th century took the first excuse that Turkey gave her and conquered Tripolitania. When the British had established their virtual protectorate over Egypt, Italy secured from the crumbling Khedival empire the south-west coasts of the Red Sea and the frontier lands of Abyssinia and the eastern portion of Somaliland. To these were subsequently added the whole of Abyssinia (q.v.).

Portugal between 1884 and 1914 extended her possessions with the consent of other Powers, and thus became the mistress over about 900,000 sq. m. in West, East, and Central Africa.

Spain, owing to her unsettled government, has procured a very meagre portion. The Canary Islands she had had since the 15th century; in the following centuries she obtained from Portugal the port of Ceuta in Morocco, which has since been extended into the Spanish zone in Northern Morocco, the island of Fernando Po in the Bight of Biafra, and Corisco Bay to the north of the Gabun. But when the great partition of Africa began she managed to secure a protectorate over the Rio de Oro coastlands of the Western Sahara, which at any rate secured for her control over some of the most valuable fisheries in the world, and a desert region which is not without its importance in various directions. Simultaneously Corisco Bay was enlarged into the valuable little colony of "Spanish Guinea" or the Muni territory.

Holland and Belgium

After the Napoleonic wars Holland directed her colonising energies to the Malay Archipelago, and in order to make herself mistress of her Asiatic empire had to eliminate British claims. For this purpose she bargained away her forts and protectorates on the Gold Coast of West Africa and acquiesced in the Britannicising of South Africa. Dutch African commerce, however, found some consolation in the loss of the Dutch African colonies by flinging itself into the development of Congo trade.

Sir H. M. Stanley (q.v.) was the main agent in laying bare the geography of this wonderful region, but, at the time he did so, the British government had no desire to take advantage of his exploits, France was exceedingly jealous of this being done, and Germany intervened obscurely and put obstacles in the British path. Great Britain had to choose, in short, in 1884, between a Niger protectorate and a Congo claim, and she chose the Niger. But while the fate of the Congo was being secretly disputed between Britain, Portugal, France, and Germany, a rival, absolutely unanticipated hitherto, stepped in and secured the splendid prize. Leopold II of Belgium wished to make Belgium a colonial power and finally settled on Congoland

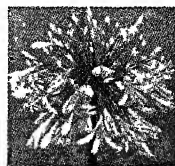
as his goal. The Congo Free State was annexed by Belgium in 1910.

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Africa General Service Medal. British decoration originally awarded in 1902 to commemorate military expeditions in East, Central, and West Africa. See Medals, colour plate.

African Lily (*Agapanthus umbellatus*). Fine bulbous plant

of the lily family, with long, fleshy, strap-shaped leaves, from the middle of which rises a leafless stem, two or three feet high. On the top is an umbel of many bright blue funnel-shaped flowers. It is a native of S. Africa, whence it was introduced to English conservatories in 1692.



African Lily,
Agapanthus

African Marigold (*Tagetes erecta*). Garden annual with a mis-



African Marigold,
Tagetes

leading name, for both this and its smaller congener, the French marigold (*Tagetes patula*), are natives of Mexico. They have much-divided leaves, the lance-shaped divisions having toothed edges. The composite flower-heads are borne singly on long stalks, which are thickened

considerably at the apex. This description applies to both species. While all the branches of the African marigold are erect, those of the French marigold are spreading. In colour, the flowers of the first are citron-yellow, of the second more tawny.

Africa Service Medal. South African award of the Second Great War. It was announced by Field-Marshal Smuts on Nov. 16, 1943, that King George VI had approved the institution of a South African medal to be awarded to all members of the Union Defence Forces or other uniformed services of the Union who "attested in service in Africa during the Second Great War before May 13, 1943," the day on which Africa was finally cleared of the Axis forces. The medal is of silver and represents the map of Africa. One side bears the inscription "Africa Service Medal," the other a leaping springbok. The ribbon is orange, with the green and gold springbok colours in vertical stripes on either side. Men and women were alike eligible for the award.

Africa Star. British award of the Second Great War, instituted Aug. 3, 1943, to commemorate the expulsion of the Axis forces from North Africa. This decoration was granted for service in North Africa between June 10, 1940 (when Italy entered the war), to May, 1943 (when operations against the Axis in North Africa ceased). The ribbon is pale buff in colour—symbolic of the desert—with a central vertical red stripe that stands for the armies, a narrower dark blue stripe for the naval forces and the merchant navies, and a light blue stripe for the air forces. It is worn with the dark blue stripe farthest from the shoulder. Awards of a clasp to the Africa Star for the

armies or in defence of Malta during the same period. In the Navy only those who served as part of the Eighth or First armies, on shore or in harbour, receive the clasp. The award to members of the Merchant Navy is restricted to those serving in vessels which worked inshore during the campaign. The star, of yellow copper zinc alloy, is identical in shape with the seven other campaign medals of the Second Great War. See Campaign Stars.

Afridi. Pathan tribe of the Indo-Afghan frontier. Tall, lean, light-tinted - Iranian Aryans, and avowedly Sunni Moslems, they speak a North Pushtu dialect. Of their eight clans the Adam Khel, of the Kohat Pass, and the Zakka Khel, of the Khyber Pass, have had to be the objects of British punitive expeditions.



Afridi of the Indo-Afghan frontier

Afrikaans. The home language of some sixty per cent of South Africa's European population. It is a direct, spontaneous, and unbroken development from the Dutch spoken in the province of Holland of the Netherlands three centuries ago. It differs from modern Dutch in that it has far fewer inflexions, less conjugation, no grammatical genders, and a simplified spelling, but especially in having its own home-grown idiom of the ox-wagon and the veld, as against that of the ship and the market-place. In the course of its growth Afrikaans has made a good many foreign words its own, but its vocabulary remains more than ninety per cent Dutch. Consider, for instance, the Dutch *Dat heb ik nooit kunnen denken* as against the Afrikaans *Dit het ek nooit kon dink nie*, for "I should never have thought that"; and *De geest is gewillig maar het vlees is swak* is, in Afrikaans, *Die gees is gewillig maar die vlees is swak*—"The spirit is willing but the flesh is weak."

The agreement between Afrikaans and Dutch is not always as close as it seems, because a particular Dutch word may have changed its meaning by being put to a new use in South African circumstances. So for instance

the Dutch *beest* may be an animal or insect, while the Afrikaans *bees* refers only to cattle. And the Dutch *meid* means very much what "maid" means in English, but in Afrikaans it is used exclusively of a coloured servant-girl. Put shortly, Afrikaans is not so much a simplified version of Dutch as a more analytic development from the same Old West Nether-Frankish dialect.

Afrikaans became a separate language about two centuries ago, but became generally known by that name only when Die Genootskap van Regte Afrikaners (The Society of True Afrikaners) was formed in 1875, and began publishing the monthly *Die Afrikaanse Patriot*. The champions of Afrikaans had to contend with opposition from Dutch as well as English from the very start, and its rights, whether constitutional or practical, have been political issues ever since. This accounts for the missionary zeal of Afrikaans writers and the comparative immensity of their output. After the South African War the cause of Afrikaans was taken up by J. H. H. de Waal, D. F. Malherbe, G. S. Preller (founder of the *Afrikaanse Taalgemeenskap* in 1906) and Eugene Marais, whose brilliant poem *Die Winternag* (The Winter Night) had appeared in 1905, and who was presently to gain an international reputation with his *Die Siel van die Mier* (The Soul of the Ant). Winternag was followed by an even greater piece of poetry in 1906—Jan Celliers' *Die Vlakte* (The Plain).

But the man who really taught the Afrikaner to read was C. J. Langenhoven, who thought at first that the cause of Afrikaans was lost, but later made magnificent amends by achieving for it an official status as the medium of instruction supplanting Dutch in the lower forms of the Cape Provincial schools. That was in 1914, and in the same year the Orange Free State and the Transvaal provincial councils followed suit. Largely because of his efforts Afrikaans became—instead of Dutch and equally with English—an official language of the Union in 1925. Since Langenhoven's death in 1932 both his further ambitions have been realized: the translation of the Bible was completed in 1933, and the Afrikaans Hymnary in 1944. Langenhoven's work was, and is being, carried on by D. F. Malherbe, Leipoldt, A. G. Visser, C. M. van den Heever, Joggem van



Africa Star. Ribbon and emblem for men of the British 8th army

army are restricted to service in the Eighth and First armies from Oct. 23, 1942, the date of the battle of Alamein, to May 12, 1943, inclusive. A silver emblem in the form of a figure 8 or 1, denoting the award, is worn on the ribbon on service dress. A clasp, denoted by the standard silver rose emblem, is awarded to R.A.F. personnel who operated in support of the Eighth and First

Bruggen, "Sangiro," the Hobson brothers, P. de V. Pienaar, Hettie Smit, and A. H. Jonker, and the poets W. E. G. Louw, N. P. van Wyk Louw, I. D. du Plessis, Uys Krige, Elisabeth Eybers, and a good many others.

Consult Professor J. J. Smith's authoritative article on the origin of Afrikaans in the Official Union Year Book for 1925; The Achievement of Afrikaans, by T. J. Haarhoff; and, in Afrikaans, E. C. Pienaar's *Die Triomf van Afrikaans*.

Jan Tromp

Afrika Korps. German army corps of the Second Great War. Erwin Rommel, after playing an important rôle on Hitler's staff in the Polish campaign of 1939 and commanding a division in France in 1940, was entrusted with one of Hitler's most ambitious military experiments—the formation of a body of soldiers to serve in North Africa. The men, specially selected by Rommel for this purpose, underwent an extremely arduous training at a camp near Hamburg, where they were subjected to the rigours of desert warfare in artificially created conditions approximating as closely as possible to those existing in Libya and Egypt.

In March, 1941, almost simultaneously with the German attack on Greece, Rommel struck at Wavell's imperial army in Western Cyrenaica, reinforcing the shattered Italian forces with the highly mechanised divisions of the Afrika Korps at El Agheila, 130 m. S.W. of Benghazi. Developing an extremely powerful weight of armour, the Afrika Korps used the ports of Tunis and Tripoli as landing-bases for its Libyan campaigns, and the speed with which supplies were landed doubtless contributed to the success of Rommel's men as they struck against the British, driving Wavell's troops back across Libya to the Egyptian border. After the fluctuating desert campaigns of 1941-42, the Afrika Korps was eventually held, and then routed, by the British 8th Army at El Alamein. In the British offensive that opened on Oct. 23, 1942, Rommel's defensive lines were smashed. Within 15 days he lost half his great tank force, and the remnants of the once powerful Afrika Korps fled across Libya towards Tripolitania and Tunisia, defeated and broken. See Alamein; North Africa Campaigns.

Afrikaner Bond. Association of Afrikaners, i.e. Dutchmen born in S. Africa, formed in British South Africa in 1880. Its object was to secure the independence of the country, "a united South Africa under its own flag." It held its first congress in 1882, and its leader was J. H. Hofmeyr. In time it became less hostile to British rule, but it was supported by the more aggressive section of the Dutch population, and during the war of 1899-1902 it sympathised with the Boers. After the war the Bond was re-organized, and its members, aiming at an extension of Dutch influence, but favouring federation under the British crown, shared in the Union negotiations of 1910. See South Africa: History.

Afterbirth. Term which includes the placenta, or mass of tissue uniting the infant with its mother, while in the womb, by means of the umbilical cord, and the membranes which surround the infant during development. Normally the afterbirth should be expelled shortly after the birth of the infant. See Obstetrics.

Afterdamp. Also sometimes called choke damp. Following an explosion in a coal mine, the air is deficient in oxygen, with high proportions of carbon dioxide and carbon monoxide, and is consequently both asphyxiating and highly poisonous. It is the cause of many fatal casualties. Rescuers in the affected pit have to wear oxygen masks. Choke damp is more correctly described as fire-damp and is given off from a coal seam. It consists largely of methane, and when mixed with air is highly explosive. It is not poisonous but affects mine personnel because of the reduction in the oxygen of the air. By the Coal Mines Act of 1911 underground workings are required to be adequately ventilated to prevent the accumulation of afterdamp and fire-damp. Fatal casualties due to the explosion of fire-damp and coal dust in 1944 were 19; there were also 8 deaths from asphyxiation due to natural gases produced in the workings. See Fire-damp; Mining.

Afterglow. A faint glow occasionally seen in the western sky during very clear weather. Soon after sunset an observer and the air for several thousands of feet above him are in the shadow of the earth which is cast by the sun as it sinks below the horizon. Therefore at this time a glow can only be seen in the upper air,

where it is produced by very fine particles and increases in intensity as the lower air becomes darker. This rosy-coloured glow disappears when the sun reaches about 68° below the horizon, but is followed in the clearest of weather by an afterglow whose shades are a delicate rose or purple colour. This afterglow is probably a second glow ring of the same origin as the earlier glow, but at a greater angular distance from the sun. Afterglows are usually best seen in winter, when the lower atmosphere is less troubled by haze. For a long time after the eruption of Krakatoa in 1883 very striking afterglows were witnessed in almost every part of the world. See Bishop's Ring.

Afyon Karahisar. Town of Turkey, capital of the vilayet of the same name. Standing at the junction of the Izmir and Anatolian rlys. 180 m. E. of Izmir, it is the centre of an opium-growing district, the name meaning "opium black castle." It has manufactures of saddlery and carpets, and there are several mosques. Its ancient name was Synnada. Pop. of vil., 299,248.

Agades. Town of French West Africa. Capital of the Saharan oasis of Air or Asben, it is on the caravan route between the Sudan and Tripoli.

Agadir. Bay and port of Morocco, 23 m. S.E. of Cape Ghir. In 1910, as a counterpoise to the influence of France in Morocco, some German capitalists bought from the sultan concessions over a large part of the country. In July, 1911, the German government sent the gunboat Panther to Agadir, and her officers promised the Moroccan kais the support of Germany in resisting the control of France. This nearly brought about a European war, but the two Powers came to an arrangement by which France was given a free hand in Morocco in return for the cession of about 100,000 sq. m. of land in the Congo basin. See Morocco.

Agag. Amalekite ruler spared by Saul against the divine command and cut to pieces by Samuel at Gilgal (1 Sam. 15).

Agaiambo. Tribe of mixed Papuan and Melanesian stock in Papua, probably now extinct. Driven by virile neighbours into the marshland behind Ketakerua Bay, they erected pile-dwellings for themselves and for the pigs which, with waterfowl and fish, formed their animal food. The

legend of web-footed Papuans arose from this tribe, whose canoe life and marsh-wading habits softened and splayed their feet.

Agā Khan. Title of Hasan Ali Shah (1800–81), hereditary chief and unrevealed imam of the Ismailite sect of the Mahomedans. Born in Persia, he claimed direct descent from caliph Ali and from Persian royalty. He was governor-general of the province of Kerman but fell out of favour and fled to India.

Agā Khan III. Sir Mahomed Shah, was born in 1877, knighted in 1902, and for important services



Agā Khan III,
Indian prince

in the First Great War was granted the status of a first-class Indian prince. He represented India at the World Disarmament Conference at Geneva, 1932, and led the Indian delegation to the League of Nations Assembly, 1932 and 1934–7, being elected president of the assembly in 1937. Hereditary head of the Ismaili Mahomedans, he founded the Moslem university of Aligarh (*q.v.*) in 1910. A well-known sportsman, he won the Derby four times. In 1935 his horse Bahram won the 2,000 Guineas, the Derby, and the St. Leger. The Agā Khan's palace at Poona was the scene of conferences in 1927 and 1931 presided over by Lord Irwin, then viceroy of India, and attended by Gandhi. In 1943–44, the latter was imprisoned there.

Agamemnon. In Greek legend, king of Mycenae in Argos, and leader of the Greeks in the Trojan War. He was the brother of Menelaus, the husband of Helen, whose abduction by Paris was the cause of the war. The Greek fleet was assembled at Aulis but detained there by a calm sent by the goddess Artemis, whom Agamemnon had offended by killing a stag sacred to her. To appease the goddess, Agamemnon agreed to sacrifice his daughter Iphigeneia; at the moment of sacrifice, however, she was carried off in a cloud by Artemis.

In the tenth year of the war occurred the famous quarrel between Agamemnon and Achilles over the possession of the captive maiden Briseis. At the end of the war, when Agamemnon returned to Mycenae, he was murdered, together with the Trojan princess

Cassandra, by his wife Clytaemnestra and her paramour Aegisthus. They were afterwards put to death by Agamemnon's son Orestes. The story is the subject of the trilogy—Agamemnon, Choephoroi, and Eumenides—of Aeschylus and of tragedies by Sophocles and Euripides.

Agamemnon. A tragedy by Aeschylus, first play of the trilogy Oresteia, acted 458 B.C. After the conquest of Troy, Agamemnon on his return to Mycenae is received with treacherous words of welcome by his wife Clytaemnestra, enticed into the interior of the palace, and murdered by her in his bath. The murder takes place behind the scenes, being indicated to the audience by the shrieks of the dying man.

Agamogenesis (Gr. *a*, not; *gamos*, marriage; *genesis*, origin). In biology, a method of reproduction found among some lower animals and in certain plants, in which the reproductive cell develops without fusion with any other cell. It is asexual reproduction. In the hydra, a fresh-water creature, this mode of reproduction is found to occur in spring and summer, when it produces these asexual buds. Having attained a certain size, they leave the parent body. See *Biology*; *Life*.

Agā Mohammed (c. 1740–97). Shah of Persia and founder of the Kajar dynasty. The son of the Kajar chief Mohammed Hasan, he was castrated in boyhood by Adil Shah, and became known as the Eunuch. After his father's death he surrendered to the Zend chief Karim Khan, by whom he was kept in honourable captivity at Shiraz. At Karim's death in 1779 he escaped from Shiraz and began his struggle for the crown. In 1795 he took Kerman, massacred the inhabitants, murdered the reigning sovereign, Lutf Ali Khan, and almost exterminated his family. He was crowned shah in 1796 at Teheran, which he made his capital, and in 1797 was assassinated by two of his slaves.

Agao. Collective name for various groups forming part of the primitive Hamitic stock in Abyssinia. They are mentioned in a second century inscription. Driven S. and W. by Semitic immigrants from Arabia, they are found chiefly in the Lasta and Agaomidir provs. Broad-faced, yellow, straight-haired, their racial characters and dialects include those of the Bogos and Falashas.

Agapanthus. Botanical name for the African lily (*q.v.*).

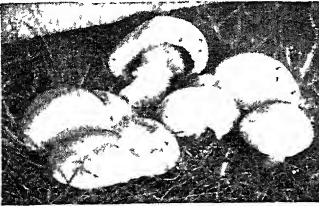
Agape (Gr. *agapē*, love). Love feast peculiar to the early Christian Church. It preceded or followed the Eucharist, and later became a charitable gathering and a social banquet. Abuses soon arose (1 Cor. 11, and Jude), and the agape was separated from the Eucharist. It was condemned by the councils of the Church, and between the 4th and 7th centuries almost disappeared. It survives in the distribution of blessed bread after the Eucharist in Eastern and French churches, and in certain gatherings held by the Moravian brotherhood. *Pron.* ā'-gāpē.

Agapemone (Gr. *agapē*, love; *monē*, abode). Headquarters of a community of both sexes, founded in Somersetshire in 1859 by Henry James Prince, formerly a doctor of medicine and a Church of England clergyman (1811–99). Prince styled himself "the beloved" and a reincarnation of the Holy Ghost. He and his followers lived in the "abode of love," a luxuriously furnished building at Spaxton, professedly with all things in common, but yielding implicit obedience to the head. Prince was succeeded by T. H. Smyth-Pigott, also a clergyman, in 1902. He was pastor of an affiliated church at Clapton, London. After many scandals, culminating in 1908, the movement died away. A similar community, the Familists, founded in East Friesland in 1540, spread to England, and in spite of a royal proclamation against it in 1580, existed until the 17th century. *Pron.* ā-gāpēm'-onē.

Agapetae (Gr. *agapetos*, beloved). Female celibates and widows who in the 3rd century devoted their lives to the service of the clergy. After being subject to repeated regulations and denounced by Cyprian, Jerome, and others, they were suppressed by the Lateran Council of 1139.

Agar. Town in Gwalior, Central India. It is 100 m. N.W. of Bhopal and 1,598 ft. above sea level. Pop. 3,586.

Agar-agar. Gelatinous substance obtained from certain red seaweeds (Rhodophyceae), obtained from Ceylon (Ceylon moss), Java, Japan (Japan isinglass), and, during the Second Great War, Great Britain. The gel (colloid jelly) from agar-agar is not liable to putrefaction and is therefore used largely as a medium for bacteriological cultures. Agar is also used in preserves, jellies, and soups, as a dressing or stiffening for light fabrics, and in constipation remedies. See *Algae*.



Agaric. *Agaricus campestris*, or the common edible mushroom

Agaric (Gr. *agarikon*, fungus). General term in botany used to denote numerous species of fungi, including the mushroom.



Agaric. Poisonous kind, the fly agaric

in the Carpathian Mts, it is on the Trotus river, 35 m. W.S.W. of Bacau. Rumanian territory was entered by the Austro-German forces at this point on Oct. 18, 1916.

Agassiz, Mount. Peak of the Andes, 10,400 ft. above sea level, named after Louis Agassiz. In Argentina, on the Chile border, it gives its name to a co. in Chile.

Agassiz, ALEXANDER (1835-1910). Swiss-American scientist. Only son of Jean Louis Agassiz, he was born at Neuchâtel, Switzerland, where his father was professor, and went with him to America in 1849. Graduating at Harvard, 1855, he became its curator at the Museum of Comparative Zoology, 1874-97. In the interval, as superintendent of copper mining south of Lake Superior, his knowledge of geology, chemistry, and engineering enabled him to develop the mines and to amass a fortune, which he devoted to zoological research. Specialising in marine zoology, he established a marine station on Rhode Island in 1875. His principal writings deal with coral formations.



Alex. Agassiz, Swiss-American scientist

Agassiz, JEAN LOUIS RODOLPHE (1807-73). Swiss-American naturalist. Born at Motier, Switzerland, May 28, 1807, he studied medicine at Zürich, Munich, and Heidelberg, was professor of natural history at Neuchâtel, 1832-46, and an ardent

follower of Cuvier. His work in 5 volumes, *Recherches sur les poissons fossiles*, was published 1833-43, and his scientific investigation of the movements of glaciers resulted in *Etudes sur les glaciers*, 1840. After lecturing at Boston, U.S.A., in 1846, he was appointed in 1848 professor of natural history at Harvard, where later he established the museum of comparative zoology. He left his great work on the Natural History of the U.S.A. unfinished. He died at Cambridge, Mass., Dec. 14, 1873. He gave his name to the Agassiz Association, an American society, formed in 1875.



Agate. Variety of chalcedony (silica) deposited from water, usually presenting a banded or ribbon-like structure due to pauses in its growth. Its hardness makes it suitable for mortars, pivots, bearings in electrical instruments and knife edges in chemical balances. The more delicately banded and coloured varieties are used as ornamental stones. The name is said by Pliny to be derived from Achates, a river in Sicily, where it was originally found.

Agates may be classed as semi-precious stones. When the bands are fairly regular the stones are known as ribbon-agates. Onyx is a ribbon-agate with cloudy white bands alternating sharply with black bands. In cornelians white alternate with red, and in sardonyx with brown. Moss agate, or mocha-stone, has beautiful moss-like patches of a fibrous mineral. The choicest varieties are found in India, Uruguay, Southern Brazil, and Bohemia. Scotch pebbles are pretty agates found chiefly in Angus and Perthshire.

Agate, JAMES EVERSHED (1877-1947). British author and critic. Born at Manchester, Sept. 9, 1877, he was educated at Giggleswick and Manchester grammar school. He was appointed dramatic critic of the Sunday Times in 1923. His many publications include a sequence of autobiographical volumes with the general title of *Ego* (1935 onwards): these form a valuable record of events and personalities in literary, theatrical, and social life. Died June 6, 1947.

Agatha (d. 251). Saint, virgin and martyr. Sicilian by birth, she suffered martyrdom under Decius at Catania, after having been tor-

tured by the praetor Quintianus, whose addresses she had rejected. Canonised by Pope Gregory I, a chapel in Catania cathedral is dedicated to her, and her festival is kept on Feb. 5. Her name is in the Church of England calendar.

Agathocles (361-289 B.C.). Tyrant of Syracuse. Of humble birth, he entered the army as a common soldier, but having married the widow of his wealthy patron Damas, became the richest man in Syracuse. Expelled from the city by his enemies, he returned with a band of mercenaries and was besieged in Syracuse 310 B.C., but triumphantly carried the war into the enemy's country in N. Africa. Henceforth (307 B.C.) he was king of all Sicily. His success-



Agathocles, Tyrant of Syracuse
Bust in National Museum, Naples

ful campaigns against the Bruttii in Italy and the people of the Lipari islands consolidated his rule.

Agathon (d. c. 400 B.C.). Athenian dramatist. He was a pupil of Gorgias and a friend of Plato and Euripides. Only fragments of his tragedies have survived, but the Alexandrian critics assigned him a high place. He wrote *The Flower*, the first Greek play with an original plot, the subject of previous dramas having been taken from mythology. Agathon was also the first to make his choral odes mere lyrics having no connexion with the theme of the play.

AGAVE OR AMERICAN ALOE.

Plant so called from a superficial likeness to the true aloe, to which it is not related, the agave being an amaryllid, while the aloe is a lily. There are many species of agave, all natives of S. America,



Agave,
or American Aloe

Mexico, and the southern United States; but the best known is the noble *Agave americana*, which is fabled to flower once in a hundred years. The stem is very short and supports a rosette consisting of from 30 to 50 leaves from 4 ft. to 6 ft. in length and more than $\frac{1}{2}$ ft. broad. They are very thick and fleshy, the upper surface is concave, and the edges are armed at short intervals with hard spines. A single leaf weighs about 12 lb., and lives about six years.

The plant matures slowly in 10, 20, 50, or even 70 years, and then very rapidly develops a flowering stem from 15 ft. to 40 ft., its upper portion with horizontal branches, which bear several thousands of yellow-green flowers. The flowering exhausts the plant, and it soon dies. The roots and leaves contain valuable fibres (pita thread) of a tough character, from which twine, cordage, and paper are made. The sap from the undeveloped flowering stem when fermented becomes pulque, the national drink of the Mexicans, and mescal, a kind of brandy of highly intoxicating quality.

Agde. Seaport and town of France, in Hérault department. On the Canal du Midi, 2 m. from the sea and 30 m. by rly. S.W. of Montpellier, it was known to the ancient Greeks as Agatha. Its fortified cathedral church of S. Étienne is medieval. It has an active coast and fishing trade.

Age (Lat. *aetas*, age, O. Fr. *age*). Physiologists divide the life of human beings into five ages: infancy to 7 years, childhood to 14, youth to 21, adult to 50, and old age thereafter. Some physiologists recognize, with Shakespeare, seven ages: infancy, childhood, boyhood or girlhood, adolescence, manhood or womanhood, age, and old age. In law a person is an infant up to 21 years, when he or she reaches majority. A child (boy or girl) cannot be legally guilty of crime before the age of 8 and only then on proof that he knew what he was doing; at 14 he can be guilty of crime without special proof. A child can be sent to prison at 17 and, in exceptional cases, at 14. At 16 he or she can marry (the consent is also required of parents or guardians up to the age of 21). Children cannot be employed if more than two years below the school leaving age. Eighteen is the earliest age at which a child can legally be sentenced to death. The sovereign becomes of full age at 18. At majority full legal rights

and obligations are applicable. In Scotland there is no legal infancy; a male is in a state of pupillage up to 14 years, a female to 12, both then becoming minors until 21. A person may marry without parental consent under 21.

In the British Empire, majority is usually reached at 21 and also in most of Europe. In France and Belgium marriage without consent of guardians was prohibited before 25. Majority ages in other countries are: China, 20; Brazil, Mexico, and Peru, 21; Argentina, 22; Chile, 24. In the United States the majority age is 21, but in seventeen States it is 18 for females. A male can vote in the U.S.A. at 21, be elected to Congress at 25, and to the Senate at 30.

The average age of Europeans has tended to increase in the twentieth century. In England and Wales the percentage of persons in the later age groups increased as follows:

Age Group	1921 Census	1931 Census	1940 Estd.*
	%	%	%
25-49	35.66	36.12	37.48
50-74	17.34	20.64	26.29
75-85 onwards	1.71	2.05	2.7
	54.71	58.81	66.47

* Civilians only

See Infant; Longevity.

For animals, reliable records of age are only obtainable under captivity or more or less unnatural conditions, and figures are accordingly vague. For instance, the African elephant has been credited with reaching 150 to 200 years. Hunters estimate that in the wild state 100 years is probable. The Indian elephant reaches 70-80 years. Other Zoological Society figures for mammals are: porcupine, 10-14 years; wolf, 12-15; reindeer, 12; antelope, leopard, sea lion, 15-20; tiger, 20; lion, Bactrian camel, 20-25; giraffe, 25; brown and Arctic bear, 30; rhesus monkey, 30-35; rhinoceros 35-40; orang-utan, chimpanzee, 40-45; gorilla, 45-50; hippopotamus, 45. For whales no reliable figures can be given, published estimates of 300 to 500 years being unsound. For domestic animals average ages are stated as: cat, 12-15 (may be greater); dog, 12-15 (authenticated cases of 25 years); horse, 25 (have reached over 30 years, equivalent to a man of 80). The common statement that a dog's age multiplied by 7 gives the human

equivalent is only partly correct, a dog reaching puberty at a much earlier relative stage, but at 5 years it may be said to be equivalent to a man at 35.

Among birds, parrots have been recorded as exceeding 100 years. Other statements are: raven, over 50; blackbird, 18; pigeon, 20; sparrow, 40; eagle, 60 and over: swan, over 100. Among fish, pike and carp are reputed centenarians. Insects have been studied, the common moth living for about $3\frac{1}{2}$ days, the mayfly for 1 day, and the dragonfly for 7 weeks. According to Weisman, protozoa, which multiply by division, are to be considered as immortal. See C. S. Minot, Problem of Age Growth, and Death, 1908.

Age. Term applied to any prolonged period of time which is regarded as having some special characteristic distinguishing it from other prolonged periods. An equivalent term is era. Occasionally, but incorrectly, epoch is used in the same sense, though it should be used only for the starting-point.

There is no limit to the length of the period which may be spoken of as an age. Geologists name ages in accordance with the formation of the earth during periods which may have extended over hundreds of thousands of years. The age of the palaeontologist or anthropologist is named according to the progress of mankind in the use of implements—the Palaeolithic and Neolithic, the earlier and later stone-periods when he employed flints, not having discovered the use of metals: the bronze age, and the iron age. Quite mythical ages, too, were imagined by the ancients, a golden age when the world was innocent and happy, a silver age of degeneration, a brazen age of violence, and the last and most unholy age of iron. But the world had entered upon the iron age before this conception had taken shape, and has remained in it.

Historians have not established such well-marked divisions under the name of ages, though the name of the Middle Ages is given to the interval between ancient and modern times, roughly speaking, from the 5th to the 15th century. The earlier and longer period of the Middle Ages is also occasionally called the Dark Ages from one point of view, and the Ages of Faith from another. The name age is given to specific sections of time, most commonly taking their title from some prominent personality, such as the Age of

Elizabeth, the Age of Louis XIV and the Augustan Age.

Ageing. Process, natural or artificial, whereby the properties or characteristics of materials are changed after a longer or shorter period of time. In rubber by perishing, in metals by fatigue, or in wood by decay, it is detrimental. In other materials it may be beneficial and be produced artificially. In alloys such as those of aluminium there is a period of age-hardening which can be hastened by heat or other treatment. Chemical changes due to the passage of time can be speeded up, as in the increased absorption of oxygen in varnishes, oils, rum, etc., by standing in open vats. Whisky is aged, or matured, by oxygen under pressure. In calico dyeing and printing, ageing machines are employed. The weathering of clay for brick and pottery making is a form of ageing. Iron used in electro-magnets in electrical machinery and transformers suffers an ageing loss which is considerably reduced by the use of special silicon alloys of iron, such as stalloy. Concrete hardens after a certain time and this is referred to as ageing or curing. See Alloy: Concrete.

Agen. City of France. Capital of the department of Lot-et-Garonne, it is on the Garonne. 84 m. by rly. S.E. of Bordeaux. The ancient Aginnum, it is a bishop's see, has a 12th century cathedral, and many old buildings and institutions. It is noted for its prunes, poultry, and other table delicacies, manufactures woollen and linen fabrics, and is an important rly. centre. It was the birth-place of the scholar Joseph Scaliger, and there is a statue of the native poet Jasmin. Pop. 24,939.

Agency (Lat. *agere*, to act). Term describing the legal relationship between a person, called the agent, who acts for another, called the principal. Agency is a matter of authority, and this authority may be implied or expressly conferred. The term agency was formerly also used to designate a group of native states in India the administration of which centred upon a British official agent.

Agent. In law, one who acts for and on behalf of another (the principal) in such a way as to make the principal legally liable for his acts and defaults.

As between principal and agent, the rights and liabilities depend on the agreement between them; but when an agent acts for his principal, the latter is bound by his

acts if they are within "the scope of his authority." By this phrase is meant that an agent of a particular class is supposed to have authority to do those acts which such an agent usually has. Thus, if a commercial traveller accepts an order for goods at £2 a ton, or on the terms of three months' credit, his principal is bound by these terms, although the traveller may have been told not to accept orders at less than £3 a ton, and to give no credit. Partners are agents for the other partners in all ordinary matters relating to the business in which they are jointly engaged.

By the doctrine of ratification, if a person purports, without authority, to act for a principal, the principal may, on learning what has been done, ratify the agency, and take the benefit and assume the burden of what has been done in his name. If, however, he refuses to recognize it, the agent is personally liable, on what is called a "warranty of authority." A wife, living with her husband, is his agent to pledge his credit for household necessities, including clothing for herself and the children suitable to her husband's station in life. The authority of an agent is revoked by the death or bankruptcy of the principal. It may also be expressly revoked at any time by the principal. And if an agent is engaged, say, for three years, and the principal revokes his authority at the end of one year, the revocation is good, though the agent may still have the right to bring an action for wrongful dismissal.

An agent is entitled, in the absence of express agreement, to the customary remuneration for his services, or, if there is no customary sum, to a reasonable amount. He must not accept remuneration from anybody but his principal, and may not make any other profit. If he does, he forfeits the right to remuneration. He is entitled to be reimbursed and indemnified for all acts done and expenditure incurred within the scope of the agency. He is liable for negligence in the conduct of his principal's business, and is bound to display all the skill and diligence necessary and usual in such agencies. Thus a solicitor must take the proper steps in an action at law; an accountant must be accurate in an audit; a stock-broker must know the prices on the Exchange. Agents on particular markets (e.g. brokers on the London Stock Exchange) can bind their principals according to the customs of those markets.

A servant is the agent of his master within "the scope of his employment," and the master will even be liable for his frauds. Thus, where a bank manager gave false information to a customer in answer to one of the usual inquiries, whereby the customer lost money, the bank had to pay, because it was part of the manager's business to answer such inquiries. The maxim, *Qui facit per alium facit per se*, i.e. who acts through another, acts himself, is always applied.

Agent-General. Name given to the London representatives of certain of the component states of the British Dominions. They act as business representatives of their governments, and have offices for the transaction of their duties. The representatives of India, Pakistan, Ceylon, Canada, Australia, S. Africa, New Zealand, S. Rhodesia, and Eire bear the title of high commissioner.

Agesilaus (c. 442-360 B.C.). King of Sparta. Though lame and of insignificant appearance, he was one of the ablest generals of his time. An appeal from the Greeks of Asia Minor for help against the Persians led him to declare war against Persia. After a victory on the Pactolus in 396 he was preparing an expedition into the interior of the Persian empire, but was obliged to return to defend Sparta against a coalition of Athens, Thebes, Argos, and Corinth. The coalition was beaten (394) at Coronea in Boeotia.

Thebes, however, gradually increased in power, and in 371 Sparta was defeated at the battle of Leuctra, and might have suffered extinction but for the efforts of Agesilaus. This danger lasted until the death of the Theban leader Epaminondas, at the battle of Mantinea, in 362. In 361 Agesilaus led an expedition into Egypt to assist King Tachos against the Persians, but died in the following year.

Aggershus or **ÅKERSHUS**. Amt or county of S.E. Norway, between Sweden and Oslo Fiord. It has several lakes, and an area of 2,064 sq. m. Oslo is the capital. Pop. 236,939. The fortress of Aggershus stands at the head of Oslo Fiord, on a headland dividing the harbour of Oslo into two parts. Erected in the 13th century, it was a royal residence down to the 18th century, then became a prison and arsenal.

Agglomerate (Lat. *agglomerare*, to form into a mass). In geology, name of deposits formed

of blocks of igneous and other rocks filling the neck of a volcano or other volcanic orifice. The blocks are usually of varying size and character. Such deposits may be studied in the shore-sections of Fife.

Agglutination (Lat. *agglutinare*, to glue). Term used in philology and bacteriology. Words or roots combined into compound terms are said to be agglutinated. Turkish, Mongolian, Japanese, and other languages are types of what are called agglutinative languages. In cases of infection by certain bacteria the blood serum has the power of producing defensive substances. Among these are the agglutinins which cause the infecting bacteria to adhere to one another in small masses or clumps and so deprive the organisms of their power of movement. While agglutination does not protect the body against disease, the reaction is valuable in the diagnosis of typhoid and para-typhoid fever, food poisoning, intestinal infections, cerebrospinal fever, and other bacterial infections. In typhoid fever, for example, a drop of diluted blood serum from the patient is added to a drop of a fluid culture of the typhoid bacillus. Examined under the microscope, the bacilli, which at first are widely distributed and moving freely, are seen an hour later gathered together in clumps, because of the action of the agglutinins produced by the typhoid infection. Agglutinins are specific for a particular infection; thus the serum of a typhoid patient will not agglutinate the organisms of cholera. *See* Bacteriology.

Aggradation. Term applied to the process by which rivers build up their beds and fill in their valleys. When rivers are overburdened with silt and flow over an almost level plain in a meandering course, the speed of the stream slackens to so great an extent that it becomes incapable of transporting the whole of the suspended mud, some of which is deposited on the bed and sides of the river. In time the deposits raise the bed and banks of the river above the surrounding level.

The lower courses of the Nile, Po, Mississippi, and Plate rivers are examples of this process.

Aggregate. Inert material combined with water and cement to form concrete. Except in certain special concretes (such as "no fines"), sand is used together with natural materials, like shingle, gravel, ballast, beach

pebbles, broken rock, and stone, or artificial aggregates such as broken brick, crushed slag, hard clinker, or coke breeze. Rock and stone aggregates are graded and sized according to a British Standard specification. For a light concrete which can be sawn and worked, sawdust is used as the aggregate. Foamed slag, which is steelworks furnace slag which resembles an artificial pumice, also makes a light concrete with good heat-insulating properties. *See* Concrete.

Aggtelek. Village of N. Hungary, in Gömör és Kis-Hont co., N.E. of Budapest. In the neighbourhood are the famous labyrinthine stalactitic caves, measuring, with side branches, over 5 m. in length, in which numerous prehistoric remains have been found.

Agha or **AGA.** Title used by the Turks for the chief of the janissaries, for military officers. and for the head eunuch. It is also used to some extent as a general term of respect. In Persia the spelling *Aga* is used, e.g. *Aga Khan*, *Aga Mohammed*.

Agheila, EL. Coastal fort of great military strength in Cyrenaica, 175 m. S.W. of Benghazi, protected on the E. by two large salt marshes, Sebkhah es Seghira and Sebkhah Gheizel, with a 15-m. gap of soft sand between them, including large areas of wind-blown crescent-shaped dunes; on the S. by a partly impassable escarpment, more sand dunes, and salt marshes; on the W. by another salt marsh, Sebkhah el Kebira. The farthest point reached, Feb. 8, 1941, during Gen. Wavell's advance into Libya, it was reoccupied March 24 by German armour after the withdrawal of Imperial forces. The British 8th army under Gen. Ritchie reached El Agheila again in Jan., 1942, but was driven E. by Rommel. In his retreat in Nov.-Dec., 1942, Rommel had no strength to make a stand at El Agheila, nor, with the opening of fresh battle-grounds in Tunisia, could he be reinforced with fresh troops; he therefore held it only long enough to compel the British to deploy in front of it, then retired to Buerat covering Tripoli. The 152nd bde. entered El Agheila Dec. 15. *See* North Africa Campaigns, and map in p. 6111.

Agincourt. British warship. The first of the name, a 64-gun ship launched in 1796, took part in the battle of Camperdown, 1797. In 1910 a warship of 27,500 tons was laid down for Brazil at

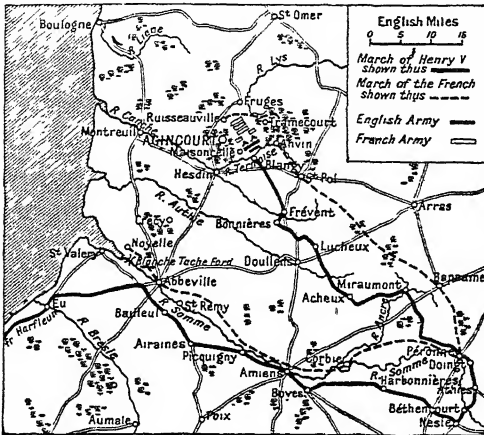
Elswick, to be called the *Rio de Janeiro*. After being launched in 1913 she was taken over by Turkey and renamed *Birinci Osman*. In Aug., 1914, when almost completed, she was appropriated by the British Admiralty, and named *Agincourt*. Commissioned for service in the Grand Fleet, she took part in the battle of Jutland.

Agincourt, BATTLE OF. Fought between the English and the French, Oct. 25, 1415. It takes its name, sometimes spelt *Azincourt*, from a village in the Pas-de-Calais, about 14 m. from St. Pol.

The English, under Henry V, had marched from Harfleur, and with some difficulty had crossed the Somme. They came into touch with the French about Péronne, and thence marched on parallel lines N.W. towards Agincourt. On Oct. 24, when they were closing in, the English being short of provisions, Henry offered generous concessions for permission to leave France, but these were rejected. After a wet night both armies were arrayed in battle order, the French "confident and over-lusty," the English sad and weary. The English were in three sections, vanguard, battle, and rearguard, but owing to numerical weakness, all were in line four deep with the archers in front. The French were crowded in three sections between Tramecourt and Agincourt, about 7,000 dismounted men-at-arms and a few cavalry forming the vanguard, wherein everyone clamoured to be in anticipation of victory.

The English opened the attack. Sir Thomas Erpingham gave the word "Now strike," and with a shout the whole line advanced. When near the foe they paused; to protect themselves against charging horsemen the archers drove sharp stakes into the ground and let go their arrows. The French vanguard then advanced, and, although the cavalry on the wings were foiled by the archers, the heavy mud, and the stakes, the footmen reached the English men-at-arms, and in hand-to-hand fighting King Henry was hit.

Soon, however, the French realized that they were worsted, and many surrendered where they stood. The victors advanced against the second line of their foes, but this and the third offered feeble resistance. The final stage of the battle was the plundering of the unguarded baggage of the English and a temporary rally by the French, events which



Agincourt. Map showing the route followed by the British force under Henry V, before the great battle of Oct. 25, 1415

led Henry to order the slaughter of the prisoners. After this he drove the remnants of the enemy from the field.

As to the numbers engaged, while the English may be put at about 9,000, the French are stated to have been 60,000 strong, but were probably 30,000. While the English losses were only a few hundreds, the French may have lost as many as 8,000, of whom 1,000 were made prisoners. See *History of the British Army*, J. W. Fortescue, vol. I, 1910.

Agio. Commercial term of Italian origin. It is the difference in value between the metallic and the paper currency of a country, and also that between the metallic currencies of different countries. For instance, if an English sovereign was only worth 19s. 6d., and was taken at this price in payment of debts abroad, the agio would be sixpence. It is not unlike the English premium. Originally the word meant accommodation, and referred to the price charged by Italian bankers when exchanging gold for silver.

Agira. Town of Sicily, in the province of Enna. It was formerly known as San Filippo d'Argiro, being on the site of the ancient Agrigum. It is one of the oldest cities of Sicily, is 35 m. N.W. of Catania and noted for its marble. Diodorus Siculus, the Greek historian and traveller, was born here. Pop. 22,485.

Agistment (Lat. *ad*, to; O. Fr. *giste*, lodging). Term in English law for the practice of hiring the right to graze cattle. The person who contracts to graze the cattle must take reasonable care of the beasts, or he is liable for damages. The agisted cattle cannot be seized for arrears of rent.

were rumours that they were to be disbanded or sent to Ireland. The agitators, who belonged to the rank and file, acted with the council of officers to resist the arbitrary acts of the Long Parliament; they obtained some money, but their main grievances were not redressed. They seized the king at Holmby House, and the army marched to London, but Cromwell restored order, and the agitators disappeared. The form adjutators arose from confusion with adjutants. Nowadays the word agitators is applied to leaders in certain political movements.

Agnano. Lake of Italy, drained in 1870. Situated 3 m. W. of Naples, it is in the crater of an extinct volcano. Near it are the sulphurous vapour baths of San Germano and the Dog Grotto.

Agnate (Lat. *ad*, to; *natus*, born). Term used in Roman law to describe persons related through descent from a common male ancestor. Cognates were persons related through descent from both male and female ancestors. The distinction was at first important, because succession to property depended upon it, but it was abolished by Justinian. See *Cognate*.

Agnel (Latin *agnellus*, little lamb). French gold coin struck in the time of Louis IX (1215-70), but not minted after 1574. It bore upon one side the emblem of the paschal lamb. See *Numismatics*.



Agnel. French gold coin of Philip IV, 1285-1314; $\frac{1}{2}$ of original size

Agitato. Musical term, derived from the Italian, and meaning restless or agitated.

Agitators OR **ADJUTATORS** (Lat. *agitare*, to act frequently). Name, merely meaning an agent, given in 1647 to the representatives chosen by the regiments of the New Model Army to present the grievances of the soldiers to the generals and to Parliament.

Their pay was heavily in arrears, and there

Agnello Pass. Mountain pass of the Asiago plateau, Italy. Here under enemy pressure the Italians were forced to withdraw their advanced position on June 29, 1917, having earlier captured the pass from the Austrians. See *Asiago Plateau*.

Agnes. Feminine Christian name derived from *agnus*, the Latin word for a lamb.

Agnes (d. 306). Roman saint, virgin, and martyr. She was beheaded at the age of 13 under Diocletian, and is commemorated on Jan. 21. A church in Rome is dedicated to her, her name is retained in the Church of England calendar, and her martyrdom is the subject of paintings by Tintoretto and other artists.

Agnes. Character in Charles Dickens's novel, *David Copperfield*. She marries David after the death of Dora. Agnes's father, Mr. Wickfield, in whose house David lodges while at Dr. Strong's school, is Miss Betsy Trotwood's solicitor, a gentle, honest man, with a weakness for drink, whom Uriah Heep seeks to ruin.

Agnesi, MARIA GAETANA (1718-99). Italian mathematician and linguist. She was born at Milan, daughter of a professor of mathematics at Bologna. At the age of nine she composed a thesis in Latin, and when thirteen knew Greek, Hebrew, and several modern languages. She displayed equal precocity in mathematics, being the author of two volumes on the analysis of finite quantities and the analysis of infinitesimals, not published, however, until she was thirty, and not translated into English until 1801. By the authority of Pope Benedict XIV she took her father's place as professor of mathematics at Bologna on his illness in 1750. After his death in 1752 she entered a sisterhood at Milan, where she became a nun, and died Jan. 9, 1799.



Maria G. Agnesi, Italian mathematician

Agnew. Family of art connoisseurs, dealers and publishers. They are now represented by the firm of Thomas Agnew and Sons, of London, Manchester, and Paris, the founder of which, Thomas Agnew (1794-1871), was mayor of Salford in 1851. Under the control of Sir William Agnew (1825-1910), the first baronet, and his brother Thomas, the reputation of the house greatly increased, and was maintained by William

Lockett Agnew (1858-1918) and other members of the family. The firm has carried out many negotiations for the National Gallery and other art galleries, and has often acted as expert advisers to the British Government. In 1870 the Agnews obtained, through marriage, an interest in



Sir W. Agnew, 1st Bt.
Bassano

Punch, and from 1890 William Agnew, as chairman of Bradbury, Agnew and Co., the proprietors of Punch, was closely identified with that periodical. He was also Liberal M.P. for S.E. Lancashire 1880-5, and for Stratford 1885-6. Until the middle of the 18th century the family, which claims descent from the Sheuchan (Stranraer) branch of Agnew of Lochnaw, resided at Clendry, in the parish of Kirkcolum, Wigtownshire.

Agni. In Hindu mythology, the god of fire. Prominent in Vedic hymn and legend, he is pictorially represented with two faces, three legs, and seven arms, and riding on, or accompanied by, a ram.

Agnomen. In Roman nomenclature, an extra name, added as a sign of service to the state or as indicative of some characteristic. Thus Scipio received the agnomen of Africanus as the destroyer of the African power of Carthage: while Fabius was called Cunctator (the delayer), in allusion to his waiting policy against Hannibal.

Agnosticism (Gr. *a*, not; *gnostikos*, knowing). Name given in 1869 by Professor T. H. Huxley (*q.v.*) to the doctrine, which he was by no means the first to state, that man does not know anything for certain about the spiritual world and existence, God, a First Cause, or the future life. Eternity and infinity, say the agnostics, are conceptions beyond the range of human understanding. Some maintain that they must always remain unknowable. The term was probably suggested to Huxley by the reference in Acts 17 to the altar at Athens dedicated to "an Unknown God" (*Agnosto Theo*).

Herbert Spencer was a leading exponent of agnosticism, and his *First Principles*, 1862, ranks with Sir Leslie Stephen's *An Agnostic's Apology*, 1893, Sir George Greenwood's *The Faith of an Agnostic*, 1919, and some of T. H. Huxley's essays as a classic exposition of

the agnostic standpoint. Agnosticism is to be distinguished from atheism, which denies the existence of God, as from theism, which asserts that existence. Nor are agnostics necessarily materialists, in the ordinary sense of the word as meaning those who believe only in the visible or ascertainable world of human experience. A spiritual world may exist, but the agnostic finds the evidence insufficiently conclusive, so keeps an open mind on the subject. But it is probably true to say that most agnostics disbelieve in the doctrine of free will, such is their regard for the principle of causation as seen throughout the universe. A critical analysis is Robert Flint's *Agnosticism*, published in 1903.

Agnus Dei (Lat. Lamb of God). Symbolic title given to Christ by S. John Baptist (John 1) in allusion to His atoning sacrifice. The representation of Christ under the form of a lamb bearing a banner or a staff headed with a Greek cross is of great antiquity in church art. The term is applied to the wax or silver medallions bearing the figure of a lamb, which are blessed and distributed by the pope on certain occasions, and is the name of a prayer in the Roman Catholic Canon of the Mass, placed after the Consecration and before the Communion. In the Holy Communion service of the Church of England the same prayer is often sung in English after the Consecration, and though not in the Prayer Book its legality was established in the case of *Read v. Bp. of Lincoln*, 1890.

Agonic Lines (Gr. *a*, not; *gonia*, angle). Two imaginary lines passing through places on the earth's surface where the magnetic declination is zero. At these places the compass points to the actual poles instead of N. or S. of them. One line passes through Eastern Europe, Arabia, the south of India, and the western part of Australia; the other from N. to S. of the American continent. See *Magnetic Declination*.

Agora (Gr. assembly). Originally used to denote the assembly of the people summoned by the kings of ancient Greece, the term came to mean meeting place. It was usually the central square of the city, corresponding to the Roman forum and the market place.

Agoraphobia (Gr. *agora*, market place; *phobos*, fear). Psychological condition in which the

individual manifests uncontrollable fear of open spaces, being, in severe cases, afraid to go alone into the street or to cross squares, fields, or parks. It is considered to be due to a complex of the unconscious mind and can be treated by psychological methods. It is the opposite of claustrophobia (*q.v.*).

Agordo. Town of Italy, in the prov. of Belluno. It stands on the river Cordevole, 15 m. N.W. of Belluno city, and was occupied by the Austrians in Nov., 1917, during their advance to the river Piave. Pop. 3,500.

Agoué. Seaport and town of Dahomé, French W. Africa. It lies W. of Great Popo, on the old Slave Coast.

Agouti, MARIE CATHERINE SOPHIE DE FLAVIGNY, COMTESSE D' (1805-76). French authoress, who wrote under the pseudonym of Daniel Stern (*q.v.*).

Agouti. South American and West Indian rodent of the genus *Dasyprocta*. The common agouti



Agouti. S. American rodent with back pair of curious three-toed feet

is about 18 ins. long and, though distantly allied to the guinea-pig, somewhat resembles a brown rabbit but without the characteristic ears. Dwelling in woods, and gregarious and nocturnal in habit, it is particularly destructive in sugar plantations.

Agra. City of India, in the United Provinces (*q.v.*) of Agra and Oudh. It stands on the right bank of the Jumna, 138 m. by rly. S.S.E. of Delhi. It is also connected with the latter by a canal, which leaves the Jumna 10 m. below Delhi and joins the Banganga some 20 m. below Agra. The city gives its name to a district, to a division comprising five districts, and to a province comprising seven divisions. The population of the city in 1941 was 284,149.

The most famous buildings are the fortress erected by the Mogul emperor Akbar in 1566, sur-

rounded by walls $1\frac{1}{2}$ m. in circumference and 70 ft. high, and containing the palace of Shah Jehan; and beyond the city to the E., the Taj Mahal (*q.v.*), completed by Shah Jehan in 1650 as a tomb for his favourite wife. Among many mosques and palaces the Moti Masjid and Jama Masjid are notable. British buildings include the government house, a medical and a teachers' training college, and barracks.

Agra is a busy commercial centre, manufacturing cotton, lace, shoes, carpets and mosaics, and serving as an emporium for wheat, barley, rice, tobacco, and sugar grown in the district. An affiliating and examining university was set up in 1927.

Under the Moguls, from 1566 to 1658, it was the virtual capital of India; and under the British in the 19th century it was capital of the North-West Provinces until superseded in 1861 by Allahabad. Captured successively by Jats, Mahrattas, and Moslems, it fell finally to Lord Lake in 1803. During the mutiny of 1857 it was besieged for several months.

Agram. Former name of the Yugoslavian town now known as Zagreb (*q.v.*).

Agrapha (Gr. *agraphos*, unwritten). Word used for reputed sayings of Jesus Christ not found in the Gospels and for certain sayings that, found therein, are thought to be interpolations. They include the sayings in Acts 20, v. 35, and 1 Cor. 7, vv. 10-12, and those found on papyrus at Oxyrhynchus by Grenfell and Hunt in 1897 and 1904, the genuineness of most of which is questioned. See Logia.

Agraphia (Gr. *a*, not; *graphein*, to write). A form of aphasia (*q.v.*) in which there is an inability to

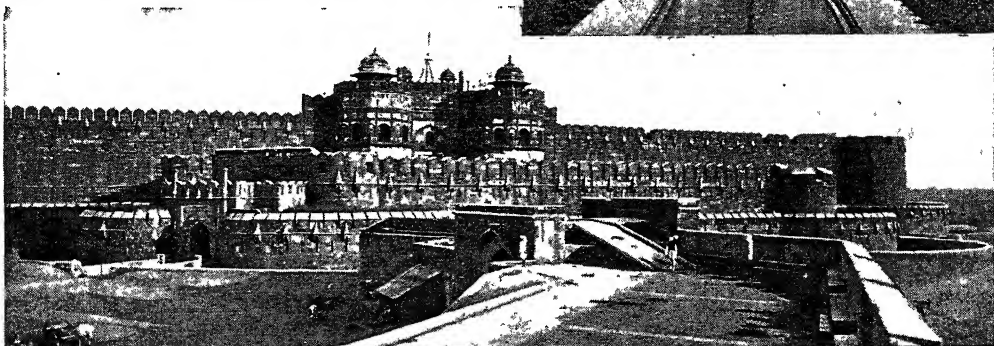
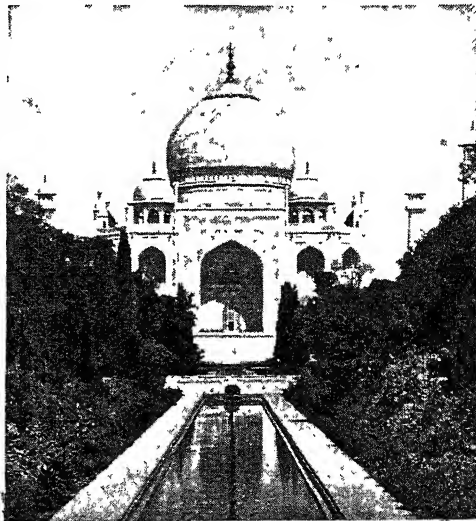
communicate or understand ideas in writing. The patient may understand spoken words but not written or printed, though he has ordinary speech. It is a defect of the mental processes, due to brain damage, usually from apoplexy.

Agrarian Laws (Lat. *agrarius*, relating to land). Roman laws, the object of which was to ensure a fair distribution of the state domains (*ager publicus*, public land). These state domains, chiefly territory taken from conquered enemies, were from the first in the hands of the patricians, who paid at first a moderate rental, but later none at all. They remained state property, though holders could bequeath and sell them. The claim of the plebeians to a fair share of the land they had helped to win led to bitter struggles. By the Licinio-Sextian laws (367 B.C.) each person's holding was limited to 500 *jugera* (about 300 acres), and there were restrictions in regard to pasture-land. For a time this worked well, but the great wars ruined the small owners and led to the growth of large farms worked by slave labour, which, in the judgement of Pliny, "ruined Italy."

The Sempronian law (133) of Tiberius Gracchus imposed a maximum limit of 1,000 *jugera* for a single family, all in excess of this being broken up into

small allotments for the poor, inalienable, and leased from the state at a small rental. The still more radical proposals of Caius Gracchus in 123 were rendered valueless by that of Marcus Livius Drusus (122), which became law, legalising alienation of the holdings, which thus again passed into the hands of the wealthy. The Thorian law (119) assigned state domains as private property to holders on payment of a tax (later remitted). This put an end to all distribution of land among the poorer classes and destroyed the lower-class landed proprietors. No agrarian laws are heard of under the empire. See *Latifundia*.

Agrarians. Term applied generally to those interested in agriculture and to the agricultural population; specially applied to a political party in the second German empire, originating in 1876 as a society for the reform of taxation. When foreign corn began to



Fort and Delhi Gate of the city of Agra. The fort, which was built by Akbar in 1566, when Agra first became the capital of the Mogul Empire, is surrounded by walls a mile and a half in circumference and 70 ft. high. Above. View of the Taj Mahal, the beautiful and famous building which stands to the east of the city.

AGRA: AKBAR'S MASSIVE FORTRESS WALLS AND THE FAMOUS TAJ MAHAL

enter Germany in large quantities the Agrarians advocated protection; after 1893 they were influential within and without the Reichstag, and their insistence on subordinating everything to the interests of agriculture embarrassed the government; but as the Socialists grew stronger, the Agrarians became less powerful and merged with the Conservatives. *See* Germany: History.

Agreement (Lat. *ad*, to; *gratus*, pleasing). In English law an agreement presupposes two or more parties and a common intention; also that it is intended to affect the legal relations of the parties. Contract is one kind of agreement. There are others—e.g. marriage. An agreement to make a gift is not a contract. An agreement to do, or abstain from doing, or to pay money, is only enforceable if the agreement is a contract. *See* Contract.

Agreement of the People. English political manifesto of the Commonwealth period. In Oct., 1647, when negotiations were proceeding between Charles I and the Parliamentarians, the Levellers, the party in the army which disliked the rule of the Long Parliament, presented a manifesto to the Army Council. This demanded a redistribution of seats, a dissolution, and subordination, especially in foreign politics, of the executive to parliament.

An altered form of this agreement, issued by the Council in Jan., 1649, was presented to parliament on Jan. 20, ten days before the King's execution. This proposed a dissolution on April 30, 1649; the institution of biennial Parliaments, which should consist of one chamber; redistribution, and a franchise based on payment of rates. Royalists were not to vote for seven years and not to sit in parliament for fourteen. The Christian religion, which was not to be either popery or prelacy, but was to be reformed to the strictest puritan doctrine, was to be professed by the nation, and with this and six other matters parliament could not interfere.

Agricola, GEORG (1490–1555). Latinised name of the German scientist and author, Georg Bauer. Born March 24, 1490, at Glauchau, Saxony, he has been called by German writers the father of mineralogy. He studied chemistry, medicine, and physics at Leipzig; and, having taken his doctor's degree in Italy, returned to Germany and began practice as a

physician at Joachimsthal. Later he moved to Chemnitz. Prince Maurice of Saxony made him his historiographer. His principal work, *De Re Metallica*, published in twelve volumes in 1556, was long the standard work on mining and metallurgy. He died at Chemnitz, Nov. 21, 1555.

Agricola, GNAEUS JULIUS (A.D. 37–93). Roman general and administrator and governor of the Roman province of Britain. In A.D. 59 he served with the Roman army in Britain, and saw further service in Asia, again in Britain, and in Aquitania. Governor of Britain 78–86, he was recalled to Rome by Domitian. Agricola is the subject of a biography by his son-in-law Tacitus, the Roman historian. This claims for him a record as a conqueror and administrator which research has failed to confirm. He constructed a line of fortifications between the firths of Tay and Clyde, but the net effect of his conquests was to advance the Roman dominion only as far as York. His recall was probably due to the feeling that the results of the campaigns were not commensurate with his efforts. There is no evidence that he was poisoned, as was supposed, by the orders of Domitian.

Agricola, JOHANN (1494–1566). German Protestant reformer, also known, from his birthplace Eisleben, as Magister Islebius. His original name was Schneider or Schnitter. Educated at Wittenberg, he became a disciple and colleague of Luther. But his teaching as to the relative positions of repentance and faith provoked a violent controversy with Luther, who pronounced it Antinomianism, apparently coining the word. In 1540 Agricola went to Berlin, where he became preacher and general superintendent at the court of Joachim II, elector of Brandenburg. He made the first collection of German proverbs.

Agricultural Bureaux, IMPERIAL. British Commonwealth institutions designed as clearing-houses of information on research in certain specialised fields of agricultural science. There is an executive committee composed of nominees of the governments of the U.K., the Dominions, and India, and annual reports are submitted to each of the governments through their appropriate members. The bureaux, with the research institution to which each is attached, are: *Soil Science*: Rothamsted Experimental Station, Harpenden, Herts; *Animal Health*:

Veterinary Research Laboratory, Weybridge, Surrey; *Animal Nutrition*: Rowett Research Institute, Aberdeen; *Animal Breeding and Genetics*: Institute of Animal Genetics, Edinburgh University; *Plant Breeding and Genetics*: Plant Breeding Institute, Cambridge University; *Pastures and Forage Crops*: Welsh Plant Breeding Station, Aberystwyth; *Horticulture and Plantation Crops*: East Malling Research Station, Kent; *Agricultural Parasitology* (Helminthology): Institute of Agricultural Parasitology, St. Albans; *Forestry*: Imperial Forestry Institute, Oxford; *Dairy Science*: National Institute for Research in Dairying, Shinfield, Reading. The executive council of the bureaux is also responsible for the administration and finances of the Imperial Institute of Entomology, Natural History Museum, London, S.W., and of the Imperial Mycological Institute, Kew, Surrey.

Agricultural Gangs. Gangs of women and children, usually taken from the workhouses and hired out to farmers to toil on the land. They were in charge of a gangmaster, who took them from place to place. The system was common in the earlier part of the 19th century, especially in Lincolnshire, Norfolk, Cambridgeshire, and the neighbourhood, where land had been recently reclaimed from the sea and local labour was difficult to obtain. The lot of these gangs was wretched, and in 1867, as the result of an inquiry, the Agricultural Gangs Act was passed. This forbade all children under eight to work in gangs and placed gangmasters under supervision, while an Act of 1876 made the restrictions still more severe, and the system soon died out. The gangs are described in Karl Marx's *Capital*.

Agricultural Hall. Building in Islington, London, between Upper Street and Liverpool Road. It was built in 1861–2, at a cost of £53,000, by members of the Smithfield Club. It covers nearly three acres of ground, and the main hall measures 384 ft. by 217 ft.: it has an arched glazed roof of 130 ft. span, and galleries 30 ft. wide. There is a minor hall, 100 ft. sq. The first cattle show was held here in Dec., 1862, and the hall was long used for the Naval and Military Tournament. During the Second Great War the hall was taken over by the Ministry of Supply, and suffered slight superficial damage from anti-aircraft fire.

Agricultural Holdings Acts.

Acts for giving greater security to agricultural tenants in England and Wales. The Agricultural Holdings Act, 1923, consolidated certain earlier Acts and formed a code for controlling the relations between landlords and tenants of agricultural land as from July 7, 1923. The Act does not cover all points arising between a landlord and a tenant. A great deal is left to what is called the custom of the country. Such custom may vary not only from county to county but also from district to district and from time to time. A custom may, however, be excluded by the contract of tenancy whereas any provision in a contract inconsistent with the main provisions of the Agricultural Holdings Acts is void.

A holding may be either wholly agricultural or wholly pastoral, or in part agricultural and as to the rest pastoral, or in whole or in part cultivated as a market garden. It does not include an allotment garden.

Agricultural land is not a holding unless it is let for a term of years or from year to year.

The Act is designed to promote good husbandry. The improvement of land is a slow process, and it is essential that a tenancy should be for a lengthy period so that the tenant may look ahead and be induced to carry out improvements to the land even though it may be years before any benefit can be reaped from them.

The Act contains two main sets of provisions designed to achieve its object. First, in order to give the tenant security of tenure, his tenancy can be ended only on long notice; second, even if the necessary notice is given the tenant is entitled to be compensated by the landlord for: (1) certain improvements carried out to the land; (2) any loss or expense caused to him by having to leave the holding.

SECURITY OF TENURE. Notwithstanding any provision in a contract of tenancy to the contrary, a notice to quit, whether given by landlord or tenant, cannot terminate the tenancy before 12 months from the end of the then current year of the tenancy. There are a few exceptions, *e.g.* when a receiving order in bankruptcy is made against the tenant.

Moreover, if a tenancy is granted for two years or more, the tenancy will not expire automatically at the end of the period for which it is granted. In order to end it

the landlord or tenant must serve a written notice to quit at least one year before the tenancy is due to end.

The combined effect of these provisions is that the landlord and tenant can both always look ahead at least one year and know that the tenancy will last for at least that time. The advantages to the tenant are obvious. The landlord benefits also in that he is given time to find a new and suitable tenant for his land.

COMPENSATION FOR IMPROVEMENTS. Improvements fall under three heads:

(1) Improvements requiring the consent of the landlord. These include any new, altered, or enlarged buildings, the construction of silos, the establishment of osier beds, the making of water-meadows and other irrigation works; the laying down of permanent pasture; the making of gardens; the making or improvement of roads or bridges; the making or improvement of water-courses, water receptacles, or works for applying water power or supplying water; the planting of hops, orchards, or fruit trees; the protection of young fruit trees; the reclaiming of waste land, warping or weiring; the erection of embankments or sluices; the erection of wirework in hop gardens; the provision of sheep-dipping accommodation; the removal of bracken, gorse, etc., in arable land.

(2) Improvements of which the landlord must receive notice, *e.g.* drainage operations.

(3) Improvements regarding which notice to the landlord is not required. Such are the addition to the land of fertilisers, either directly or through the agency of stock; the laying-down of temporary pasture, of which the seeds are sown more than two years before the tenancy determines; and the execution of necessary repairs to buildings.

The tenant must give the landlord notice of his intention to do the repairs and may carry them out only if the landlord fails to do so within a reasonable time.

COMPENSATION FOR DISTURBANCE. When a tenant is compelled to leave his holding, even on proper notice, he may be entitled to compensation for disturbance.

The amount of compensation is the loss or expense caused to the tenant in connexion with the sale or removal of his household goods, implements, fixtures, farm

produce and stock; but to avoid dispute the amount is computed at one year's rent unless the tenant proves that his loss and expenses exceed that amount. The maximum obtainable is two years' rent.

The tenant has no right to compensation for disturbance if (1) he is not properly cultivating the holding; (2) he is in arrears with his rent or has failed to remedy a breach of a term of his tenancy consistent with good husbandry or has materially prejudiced the interests of his landlord by committing an irremediable breach of such a term; (3) he has become bankrupt or compounded with his creditors; (4) he has failed to agree to arbitration as to his future rent; (5) he has, without good reason, failed to comply with a demand of the landlord to execute an agreement setting out the existing terms of the tenancy.

A tenant who has himself given notice ending the tenancy may with some exceptions claim compensation for disturbance if the reason for his notice is that the landlord has failed to agree to submit the amount of the future rent to arbitration. A claim to have an arbitration as to rent cannot, however, be made oftener than every two years.

In certain other events the right to compensation for disturbance is also lost—*e.g.* if the landlord has offered to withdraw the notice to quit and the tenant has unreasonably refused to agree; or if the tenant has not given notice of his intention to claim compensation at least one month before the end of the tenancy; or if the tenant has died within three months before the notice to quit. The landlord must have had a reasonable opportunity of valuing the goods, implements, fixtures, produce and stock, to be sold.

Where the value of a holding has been increased by the continuous adoption of a standard of farming which has been more beneficial than the standard (if any) required by the contract of tenancy, the tenant is entitled to further compensation representing the value to the incoming tenant. Likewise the landlord may recover from the tenant compensation if the value of the holding has deteriorated through failure by the tenant to cultivate according to the rules of good husbandry as defined in the Act. The compensation will be estimated by a single arbitrator, to whose appoint-

ment both parties agree, or who, in default of such agreement, is nominated by the ministry of Agriculture and Fisheries.

The Acts also contain provisions compensating a tenant for damage done to his crops by game, and others (1) entitling him, subject to certain conditions, to remove at the end of his tenancy fixtures, such as engines or fencing affixed to the holding by him; and (2) limiting the landlord's right of distress.

Some of the provisions of the Acts are slightly modified in their application to market gardens.

The Agricultural Holdings (Scotland) Act, 1923, consolidated certain earlier measures for the same purpose as in the case of England and Wales.

War-time Holdings

During the Second Great War it became necessary to plough much land which had not recently been used for agricultural purposes. The considerations which led to the passing of the Agricultural Holdings Acts did not arise in the case of temporary war-time tenancies of land of this kind, and accordingly such tenancies were for the most part excluded from the Acts by the Agriculture (Miscellaneous War Provisions) Acts, 1940 and 1943.

The urgent need for food made it necessary that land should be cultivated very intensively, and this often involved a wide departure from long-established agricultural practices. The ministry of Agriculture was therefore given the widest and most absolute powers, many of which were delegated to the war agricultural committee appointed by the ministry to replace the peacetime agricultural committees of the local councils.

The minister could give directions as to how land was to be cultivated, and if the directions were not obeyed he could compel the tenant to give up possession of the land. On a tenancy being terminated in this way the tenant was entitled to compensation for improvements but not to any compensation for disturbance.

When a landlord or tenant gave notice to terminate the tenancy the committee had to be informed.

When a tenant was directed to plough up permanent pasture, any liability under his tenancy agreement or any custom or rule of law to sow it again or pay increased rent or a penalty was extinguished.

Where, to comply with directions, he had removed bracken, gorse, etc., he was entitled to compensation for the improvement, even if the landlord had not consented as required by the Agricultural Holdings Acts.

Agricultural Labourer. One who works on the land for weekly wages. According to estimates there were in June, 1948, 689,000 male (excluding prisoners of war) and 129,400 female (excluding the W.L.A.) agricultural workers in the U.K.

Owing to low wages, bad housing, long hours of labour, and a general lack of the amenities of life, and to the facts that they had no proprietary interest in the soil and no prospects of material advancement, agricultural labourers for long were regarded as the poorest and most depressed class in the social system. They alone had little or no share in the great social advances of the 19th century. According to an official return issued in 1910 their average wages were then only 17s. 6d. a week, 14s. 6d. in cash and the balance in kind.

One remedy for these ills, the formation of a strong trade union of agricultural labourers, was unsuccessful in the 19th century. The prospective members were isolated, poor, and timid; moreover, conditions varied greatly in different districts. One such union broke up in 1872 through the pressure of adverse circumstances. However, there was a revival of agricultural trade unionism in 1906. Though the total income for the first full year was only £166, the figure had risen to £87,000 in 1943, when the union claimed 2,100 branches. The union is represented on all public bodies connected with agriculture, and hundreds of its members serve on parish, district, and county councils. Its aim is to establish the right of the farm worker to a standard of life equal to that of other workers.

Meanwhile various schemes of improvement have been put forward by politicians and social reformers. The Corn Production Act of 1917 established an Agricultural Wages Board by which wages are fixed. This board is a department of the ministry of Agriculture and Fisheries. Wages formerly varied considerably from county to county. The average minimum for England and Wales was in 1939 35s., and in 1945 70s., a week. In 1949 the board established a minimum of 94s. for men, 71s. for women.

Agricultural Research Council. British official body incorporated by Royal charters in 1931 and 1933. It consists of agricultural experts appointed by the government and charged with the tasks of advising the development commissioners and the agricultural departments upon the application of moneys voted by parliament for the furtherance of agricultural research, and the promotion of research with the aid of funds voted by parliament and received from private sources, societies, etc. The council's field station is at Compton, near Newbury, Berks.

Agricultural Society. Association of farmers and others connected with the land for the furtherance of common aims.

The oldest existing organization of the kind in Great Britain is the Bath and West of England Agricultural Society, which extended its operations to the southern counties and to Wales. It was founded in 1777 for the encouragement of agriculture, arts, manufactures, and commerce in Somersetshire, Wiltshire, Gloucestershire, and Dorset, and the city and county of Bristol. The society has rendered great services to agriculture by holding shows and meetings, awarding prizes for stock and produce, issuing publications, and retaining experts for the assistance of its members.

The Highland Society of Scotland was founded for similar ends in 1784, obtained a charter in 1787, and changed its name to the Highland and Agricultural Society of Scotland in 1834, when a new charter was obtained. Before 1881 the society played an important part in veterinary training, and from 1856 to 1900 conferred agricultural diplomas.

The Royal Agricultural Society of England, founded as the English Agricultural Society in 1838, was so styled by a charter granted in 1840. Its famous shows are the largest of the kind held in Britain, each year at a different centre, and the addition of a horticultural section has proved a special attraction. The annual journal is of high standard, and the society has published several editions of a standard text-book, W. Fream's *Elements of Agriculture*. It also issues technical leaflets and pamphlets from time to time. The Royal Dublin Society, founded in 1731 and granted a charter in 1749, is the Irish equivalent of the Royal Agricultural Society.

AGRICULTURE: HISTORY AND PRINCIPLES

LORD BOYD-ORR, Director-General U.N. Food and Agriculture Organization, 1946-48

This general article surveys the development, social, economic, and administrative, of mankind's most essential industry from primitive times to the age of mechanisation and scientific research. For information on methods, see Cattle; Dairy Farming; Farm; Ley Farming; Pasture; Poultry; Sheep, etc.; also articles on Crops; Food and Nutrition; Food and Agriculture Organization; Manure; Root (Crops), etc.

Agriculture (Latin *ager*, a field; *cultura*, tillage) is the basis of civilization. Primitive man depended for his food on natural vegetation and the chase, and hence human society was limited to small tribes moving from place to place in search of food. The development of agriculture led to the permanent settlement of communities in the areas where food was grown and so to the rise of cities with a relatively secure food supply all the year round, making possible conditions favourable to discovery and invention, with resulting growth of civilization. Agriculture continues to be the foundation on which civilization rests. The products of the soil, e.g. food and raw material for clothes and many other commodities, still supply the primary necessities of life and exceed in value the products from all other sources.

Even with the great development of other industries, there are still more people in the world engaged in agriculture than in all other occupations put together. Nor is there any likelihood that the importance of this basic industry will decrease, at least in the immediate future. The carrying-out of the recommendations of the United Nations Food and Agricultural Conference of 1943 was to involve doubling world production of the more expensive agricultural products. This would have far-reaching social and economic consequences.

Prehistoric Agriculture

The beginnings of cultivation and the domestication of animals occurred some time between 20,000 and 10,000 B.C. It may be assumed that the use of grain as food occurred earlier. Wheat grew wild in Eastern Asia and in the great Mediterranean Valley, now the Mediterranean Sea, and it is most probable that primitive man learned to knead and pound the seeds for food long before he learned to grow it. The origin of cultivation was the discovery that seeds buried in the ground reappeared as living plants bearing seeds of the same kind. This new conception must have had a profound effect on the myth-making mind of primitive man. Rituals

became associated with seedtime and harvest. Among the Neolithic peoples, sowing was traditionally associated with the offering of a human sacrifice, usually of the finest youth or maiden in the tribe.

For many centuries progress in cultivation was slow. About 5000 B.C. a rapid development began in both Egypt and Mesopotamia. The earliest actual evidence of systematic cultivation consists of wheat grains found in pre-dynastic tombs in Egypt and early Sumerian dwellings in Mesopotamia, dating in both cases from about 3500 B.C. The Sumerian grains are assigned by experts to be the highly developed species of *Triticum compactum*, thus indicating that even by this time selection of seed for the improvement of the crop had been already well established. It is probable that artificial irrigation was practised as early as this.

Egypt, Greece, Rome

By the time of the Egyptian 5th dynasty (c. 2750 B.C.) and that of Hammurabi in Babylonia (c. 2120 B.C.) agriculture had become a highly developed industry. The stone axe used as a crude hoe and other primitive tools had been replaced by ploughs, seed drills, and other agricultural implements not unlike those used in the most advanced countries until about the 18th century. In Egypt the main crops were wheat, barley, millet, peas, beans, and edible roots. The principles of manuring were understood and practised. Cattle were selected for breeding. The land was divided into great estates worked by slaves. In Biblical times the Israelites were a great agricultural nation. The land was regarded as being held direct from Jehovah. It was parcelled out among 600,000 occupying owners, and the holdings could not be alienated by debt. The land was well watered by irrigation and enriched with manures. It is described in 2 Kings 18 and 32 as a land of "corn and wine, a land of bread and vineyards, a land of olive oil and honey."

An account of agriculture in Greece is given by Theophrastus (3rd century B.C.), the first writer on botany. He describes the mix-

ing of soils, manuring, and other agricultural projects in vogue in his time. In the 5th century B.C. more than half of the Athenian citizens were owner-occupiers. A normal-size farm included about 30 acres of arable land, 4 or 5 acres of vines and olives, and some orchard and pasture. In addition to these farms a large number of agricultural labourers were the holders of small plots.

Descriptions of Roman agriculture are given by Cato, Varro, and Virgil (2nd and 1st century B.C.). In the early days of the Republic a high proportion of the citizens of Rome were working farmers. A typical Roman farm in the 1st century B.C. was one of about 150 acres worked by the owner with a bailiff and farm hands who were slaves. It was a system of mixed farming with a variety of crops and cattle, sheep, and pigs. The Romans were skilful farmers. They practised fallowing to rest the land and a good rotation with legumes to enrich the soil in nitrogen, though, of course, the means whereby the legumes enriched the soil were unknown. They grew green crops and ploughed them in as manure, irrigated the land, and were careful in the selection of seed for the improvement of crops. As the wealth of Rome increased, however, under the Emperors, supplies of grain were brought from Sicily, Sardinia, and Africa. The small farms were merged into large estates (*latifundia*) worked by slaves and used mainly for grazing and for the large-scale production of wine and oil.

The Middle Ages

After the fall of Rome agriculture deteriorated, and throughout the Dark Ages in Europe both the science and practice of the industry were at a lower level than that which was attained in the Mediterranean civilization at the beginning of the Christian era. A notable exception was found in Spain, occupied by the Moors. There agriculture reached probably the highest level which had ever been attained by that date, a level not surpassed by any Western European country until the 18th century. An account of the science and art of farming in

Spain, including such advanced science as plant diseases, is given by the Moorish writer, Ibn-al-Awam (12th century).

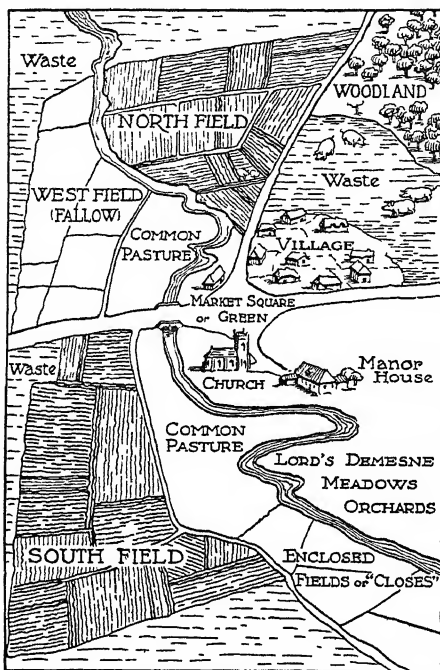
In Western Europe in the first 3 or 4 centuries B.C., apart from the villas of the Romans, agriculture seems to have been based on the common ownership of the land by the people, who lived together in small hamlets of usually 10 to 20 families, though some contained as many as 100 families. Families cooperated in cultivation. In medieval Europe a feature that emerged from the Dark Ages following the fall of Rome was the predominance of the great proprietor, the *dominus* or lord. Under Charlemagne cultivated land was in part reserved for the lord's profit and in part granted to the serf in return for ploughing and reaping services on the lord's reserve. The tenure of land became the basis of military service, and thus the feudal system emerged.

At the outset of the feudal period in England the bulk of the population were peasantry or serfs (villeins), who formed village communities, the unit of land holding and cultivation being the manor.

There was common pasture and there was also village arable land, consisting of unhedged areas many acres in extent, divided into three sections or "fields," one of which was left fallow each year. Land belonging to each villager was divided into numerous small separate strips spread all over the area, perhaps to secure equal productivity. The strips were from one to one-and-a-half acres each, separated by a furrow or ridge (a balk).

This form of strip farming and common cultivation disappeared very gradually and some medieval strips still exist in England today. Soil was improved by the use of marl, by ploughing in the stubble, and by pasturing herds on the arable land after harvest. The chief crops were wheat, rye, oats, barley, peas,

beans, and vetches. Two bushels of wheat or rye were sown per acre, and the yield was only about 10 bushels. About 10 bushels of oats or barley were sown, giving a yield of 12-16 bushels. The grazings consisted of natural grasses and weeds. Artificial grasses and clovers were unknown, and there were no root crops. Hay was cut in the meadows for winter feed, but it was of poor quality.



Agriculture. Manorial system of the Middle Ages: two great "fields" were divided into strips, a third was left fallow. There were also common pastures and "closes" in individual occupation

The dead weight of cattle was only about 300 lb. and of sheep about 28 lb. Owing to the lack of winter feed, cattle to be used for beef were killed and salted in the autumn. Swine, which were plentiful, had to subsist mainly on what they could forage in the woods. Hens and geese were plentiful, and the lords kept great flocks of pigeons in dovecotes, both for eating and for manure. The pigeons which lived on the grain were a great source of grievance to the villagers. Wheat and rye were used for bread, rye being the peasants' chief bread. Barley was used for brewing. Oats were grown extensively in the north of England and in Scotland, but less on the tenants' land in the south.

The manors were largely self-contained. There was little

surplus for sale. The lord of the manor got such money as he needed mainly from the sale of livestock and their produce. The completion of the harvest was an occasion for general rejoicing and merriment because it meant a food supply for the winter was secured. In years of bad harvest there was often a scarcity approaching famine. In 1315, owing to incessant rain during the summer, the harvest was so poor that it was followed by a dreadful famine accompanied by pestilence. Poor harvests, followed by food shortage and high prices, occurred not infrequently until the 19th century, when home production began to be supplemented by imports. On three occasions as late as the 18th century, failure of the harvest in Scotland was followed by the death of thousands of people through starvation.

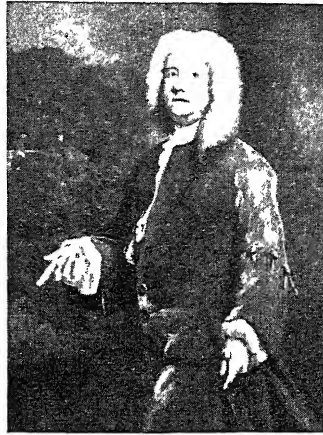
The manorial system began to decline in the 13th century, when, by the Statute of Merton (1235), the lords were allowed to enclose land provided they left sufficient common land unenclosed to meet the needs of the commoners. The lords began to commute services for payment in money or in kind with which they hired labour for work on their own land. Villeins thus became tenants. This led to an increase in productivity, because the tenant, in addition to providing for his own needs, had to provide a surplus for rent. Part of the surplus was sold by the lord, thus increasing the trade in corn.

The breakdown of the manorial system was accelerated by the Black Death which raged in 1348-49, carrying off nearly half of the population. This caused a great shortage of labour. Wages rose, and serfs found it easy to escape from their masters and get employment on other estates as free men. The Statute of Labourers in 1349 fixed wages at the 1346 level. The resulting discontent led to the Peasants' Revolt in 1381. The labour problem was partly solved by abandoning the wasteful manorial system. The separate strips belonging to individual holders were collected into one unit and enclosed with a hedge. This economised labour. A further saving of labour was made by converting cultivated land to grazings for sheep, which were highly profitable owing to the great and constant demand for wool for export to Flanders.

The enclosure movement, which began in a small way in the 14th

century, continued and reached its peak between 1700 and 1845. The enclosures caused serious discontent among the villagers deprived of their land. In some districts they revolted. A serious revolt occurred in East Anglia in 1547. When the enclosure was carried out by holders who collected the strips into one unit by agreement, the development was beneficial and there was no discontent. Indeed, the change from the wasteful open-land cultivation in strips to enclosed fields was essential to the development of modern efficient agriculture. But the enclosure of common lands and the eviction of peasants with inadequate or no compensation for the sake of the profits to be made from sheep has been condemned by most writers. Hundreds of Acts of Parliament dealing with enclosures were passed, most of them promoted by landlords to legalise their action. In 1845 an Act was passed which was designed to safeguard the interests of peasant-holders, but by that time it was almost too late, for practically all the agricultural land in the country had already been enclosed.

Enclosed fields under the continuous control of one individual made possible the carrying-out of experiments with improved methods. Early in the 18th century a number of landlords began



Agriculture. Jethro Tull (1674-1741), who gave up his career at the bar to study and practise farming
Royal Agricultural Society

experimenting with new crops and new methods of cultivation, and in the 18th and 19th centuries agriculture, which up to the end of the 17th century had changed little since the Dark Ages, underwent a revolution almost as drastic as the Industrial Revolution.

New Men and Methods

The first great pioneer was Jethro Tull. He showed that the yield of crops could be increased by proper cultivation to eradicate weeds. He is also credited with

inventing the seed drill to replace the wasteful method of broadcast sowing. A primitive form of seed drill, however, was in use long before his time. More important innovations were introduced by Lord Townshend, who left politics in 1727 to devote himself to the improvement of his estate in Norfolk. He introduced artificial grasses and clovers and the turnip crop and showed that a rotation of crops, e.g. wheat, turnips, barley, and clover, kept the land in better condition than the old wasteful method of leaving land fallow for a year.

The improvement in pastures and the use of turnips for winter feed was followed by a remarkable increase in the weight of cattle and sheep. The average weight of cattle rose from about 350 lb. at the beginning of the 18th century to 800 lb. at the end of it, and, of sheep, from 28 lb. to about 70 lb. In Roxburghshire the increase in the size of the cattle fed on the new pastures in summer and on roots and straw in winter was so great that some people regarded them as unnatural "monsters" and were afraid to eat the beef from them.

The improvement in feeding was accompanied by an improvement by selective breeding. Robert Bakewell produced the famous Leicester breed of sheep



Agriculture. These engravings by David Loggan, dating from about 1675, are of the country round Cambridge in pre-enclosure days. The lower view shows corn being reaped by the village farmers, while above is a field from which the crops have been gathered, leaving it free for huntsmen and the peasants' livestock

and Robert Colling the famous Durham cattle. A demonstration of how these new ideas worked out in practice was given by several landowners, the most noteworthy of whom was Thomas Coke, whose estate in Norfolk became famous and attracted many visitors. These improvements, which occurred in localised areas, took a long time to spread over the whole country. Arthur Young, though a failure as a practical farmer, grasped the significance of the new ideas and had a gift for exposition. He travelled widely throughout England and the Continent. In 1784 he began to publish the *Annals of Agriculture*, and in 1793 became the first secretary to the Board of Agriculture. His lectures and writings disseminated the new knowledge. Towards the end of the 18th century agricultural societies began to be formed. These promoted improvements by holding agricultural shows and demonstrations and arranging for lectures and publications. By the middle of the 19th century modern methods had replaced medieval methods on most farms.

Science and Mechanisation

The latest development has been the application of modern science to increased agricultural efficiency. Early in the 19th century Liebig, on the Continent, analysed plants to find out what substances were needed to promote their growth. The Board of Agriculture employed Sir Humphry Davy to give lectures on agricultural chemistry. Lawes started experimental work at Rothamsted in 1835 to show the effect of artificial fertilisers. The results were so striking that phosphates, potash, guano, and other nitrogenous substances gradually came into general use.

Agricultural research on a big scale, however, did not begin until the 20th century. In 1911 the Development Commission, which had been set up to promote rural industries, set aside part of their funds to promote the establishment of agricultural research institutes in different branches of agricultural science. About a dozen of these have since been established. As a result of the work of these and other institutions, in both Great Britain and other countries, there has been a marked improvement in agricultural production in the last few decades. Thus, for example, new strains of plants, giving higher

yields and, in many cases, with a higher resistance to disease, have been bred and rapidly brought into general use. Better types of grasses and clovers have been introduced, with resulting improvement of pastures and increased fertility of the soil. In animal husbandry the new science of nutrition has been applied to the elimination of diseases due to the deficiency of vitamins and minerals, and to improved methods of feeding, leading to increased yield and greater resistance to disease. Great advances have been made in the treatment and control of some diseases of both animals and plants, though disease of one kind and another is still the cause of enormous losses.

The result of all this application of science has been to increase potential food production. It is estimated that the full application of the best agricultural methods could lead to the production of as much as is at present being produced in the world on half the area under cultivation, and that we have now the knowledge to produce sufficient food to feed three times the present population of the world.

An almost equally important contribution which science has made to agriculture is mechanisation. In 1799 a mechanical reaper was invented. Later there appeared a reaper and binder, and then, finally, the combine harvester which cuts and threshes the grain in one operation. The tractor is now rapidly replacing horses. Milking machines, electric incubators, and new and improved implements for practically all kinds of farm operations have been introduced in the last two or three decades. It has been estimated that in wheat production one day's labour by the most modern methods is equivalent to about a month's labour by the 18th century methods. The rise in wages of farm workers has accelerated the adoption of every possible labour-saving device.

Other Countries

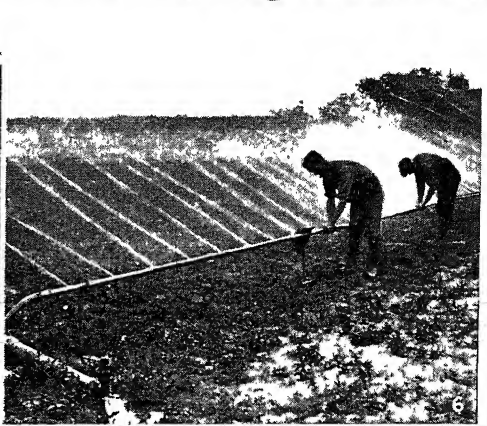
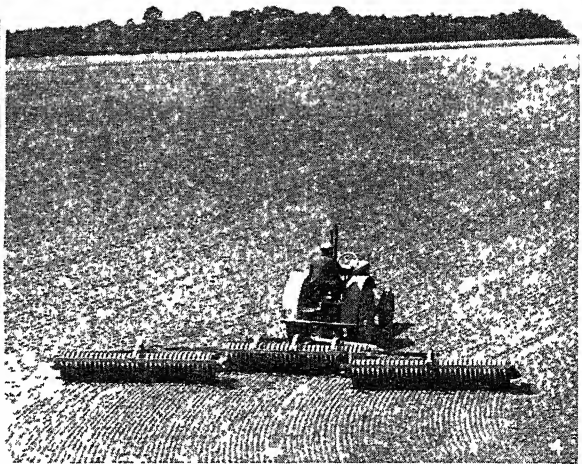
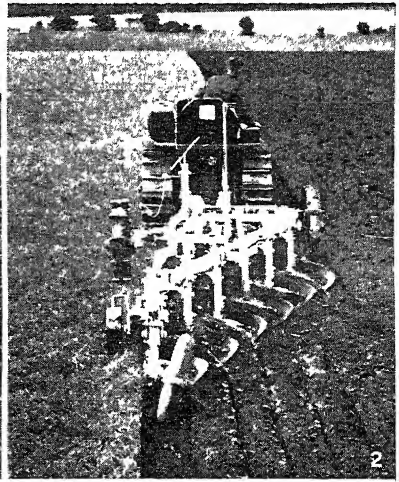
The foregoing account of the development of agriculture in the last two or three hundred years is based mainly on what took place in England. In all countries, developments, so far as they have taken place, have followed roughly the same general course. In Scotland, until towards the end of the 18th century, improvements lagged far behind those in England, but when the change-over to modern methods did begin they moved

much more rapidly, and towards the end of the 19th century agriculture in Scotland was on the whole more efficient than in England and both beef and dairy cattle excelled in quality. Denmark, during the 19th century, developed a highly efficient agriculture, especially in dairying, pigs, and poultry, from the products of which they had a large export trade, mainly to England. Agricultural developments in Holland preceded those in England. Indeed, many of the improvements introduced by English agricultural pioneers were imported from Holland, which still excels, especially in dairying and in market gardening. In France the small size of the holdings has delayed the introduction of mechanisation. In Eastern European countries agriculture is not so well developed as in England. North America led the world in mechanisation, but the yield per acre of grain crops is less than in England, where more intensive methods, with a more liberal use of fertilisers, are practised.

In the U.S.S.R.

In Asiatic countries, where the great bulk of the population is still engaged in agriculture, some of the methods are more primitive than those in use in Rome and Greece in classical times. In Soviet Russia a revolution in agriculture has taken place since about 1925. Very large communal farms have been established and rapidly mechanised. In agricultural research, especially in soil science and plant breeding, Soviet Russia is, in some respects, in advance of all countries. Artificial insemination as a means of rapidly improving the breed of cattle, etc., which was introduced in Russia in pre-war days, has been so successful that it has since been introduced in England. There are thus in the world today all gradations of efficiency in agriculture, from the most modern farms with high yields and high output per man hour to the most primitive methods which have not changed for 2,000 years.

The problem of how to produce food in abundance has been solved, but there remains the difficult economic and political problem of adjusting agriculture to modern world conditions. In subsistence agriculture, where most of the food produced is consumed locally, prices are of less importance than the fluctuation in yield due to climatic factors, but as the trade



1. Guiding an old-fashioned plough drawn by horses, a crofter near Stornoway plods along the furrow he has just cut. 2. A Ransome six-furrow plough drawn by a caterpillar Diesel tractor. 3. Single roller, horse-drawn. 4. Triple roller drawn by a tractor. 5. Laborious hand-watering of a crop threatened by drought. 6. Multiple spray installation on fields at West Drayton

AGRICULTURE: CONTRASTED METHODS OF YESTERDAY AND TODAY

Photos, 1, Topical; 2 and 4, *Farmer's Weekly*; 3 and 6, *Planet News*; 5, *Fox*

in foodstuffs grew, prices became of paramount importance, and they have always fluctuated often violently. This is especially true of wheat. Thus, for example, in 1709 wheat in England was 81s. a quarter; in 1732 it had fallen to 24s. In the 19th century it fluctuated between 126s. and 22s. 10d. When the price of food goes up, the poverty of the poor, who spend the greater part of their total income on food, increases. On the other hand, a sudden fall in prices brings ruin to the farmer who has difficulty in reducing his cost of production.

This rapid fluctuation in prices, with resulting social and economic evils, runs through the history of agriculture since medieval times, and is still unsolved. Several attempts were made by Parliament to stabilise the price of grain at a level profitable to the farmer by measures such as import duties, tariffs, subsidies for export, or price-fixing. Until the outbreak of the Second Great War governments were groping after a solution of this difficulty. It had been realized that the fall in prices affected more than the farmer. The decrease in his purchasing power led to a decrease in the prosperity of industry and trade. The difficulty is always increased by the incidence of war, when there is a rise in prices followed by a post-war slump.

Controlling the Market

Prices rose during the First Great War, but from 1920 onwards prices fell and some foodstuffs became almost unsaleable. Some countries imposed tariffs to prevent the importation of cheap food, and the internal price was sometimes double the world price. In Great Britain and the U.S.A. measures were taken to control production. In Great Britain agricultural marketing boards were set up under two Acts of Parliament (1931 and 1933), giving producers power to control the amount marketed and to fix the price. Wheat-exporting countries tried to make arrangements for each to reduce production according to an agreed ratio. These measures, designed to adjust production to economic demand, tended to stabilise the industry.

The position was complicated, however, by the new science of nutrition which showed that even in the relatively wealthy countries, like Great Britain and the U.S.A., a third of the population did not have sufficient of the right kind

of food for health and that the main reason for this was poverty. Thus two contradictory policies were urged, one for reducing production and raising prices in the interest of farmers, the other for increasing production and lowering prices in the interest of public health.

In Great Britain the milk-schools scheme (1934) served to absorb a considerable amount of the surplus liquid milk. In the U.S. the Food Stamp plan (1939) enabled low-wage earners and unemployed to purchase certain foods at half-price. This achieved the desired object of putting the so-called glut of food into empty bellies. Various measures of this kind were adopted as temporary expedients to reconcile the interests of producers and consumers. In 1935 the assembly of the League of Nations discussed the world food position in relation to the interests of agriculture, public health, and trade, and considerable progress was made in evolving a new policy designed to bring about what has been called "the marriage of health and agriculture."

The Second Great War

When the Second Great War broke out, Britain adjusted its agriculture to the food requirements of the people. Home production *plus* imports were planned to provide, as far as possible, the food needed to maintain the health of the whole population. To increase home production, farmers were offered a guaranteed market at a guaranteed price much above the pre-war level. By rationing, subsidising food to the extent of over £200 million p.a., and making provision for the special needs of mothers and children, and of heavy workers, distribution was based on the nutritional needs of different classes of the population.

This war policy of production for consumption and distribution according to nutritional needs brought prosperity to farmers and a marked rise in the standard of living of farm workers. In spite of the scarcity of some foods, the equitable distribution, with retail prices within the reach of every family, resulted in a definite improvement in the state of nutrition of the poorest third of the population.

The present trend of thought is that the principles of the war food policy, with modifications to suit peace-time needs when food is more abundant, should be the permanent food and agricultural

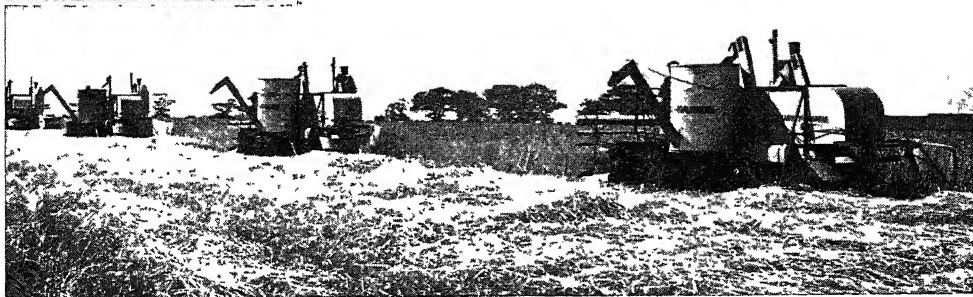
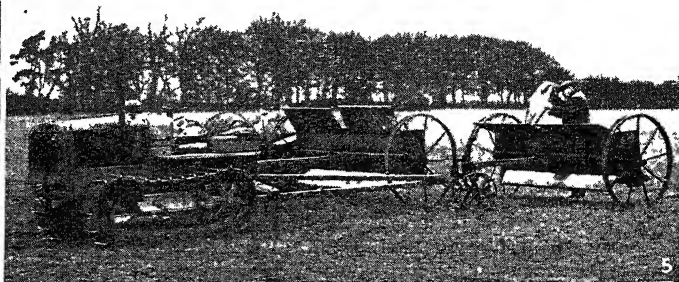
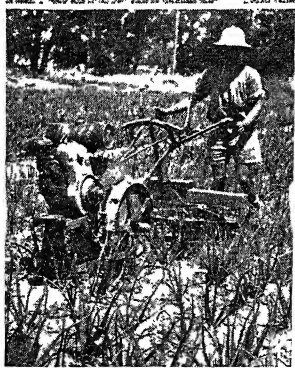
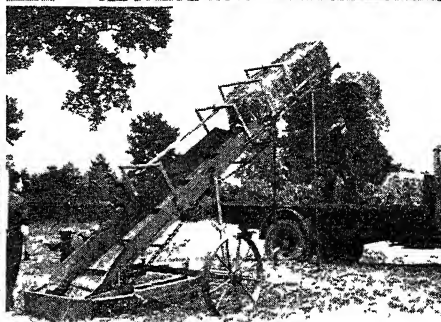
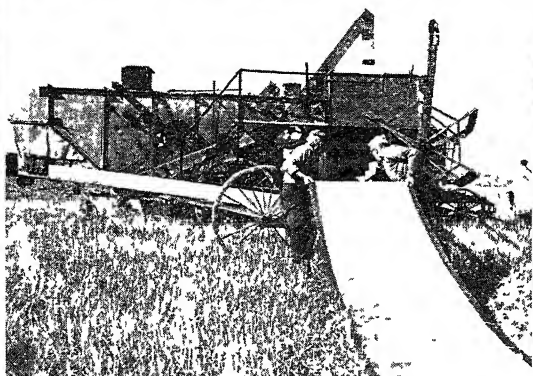
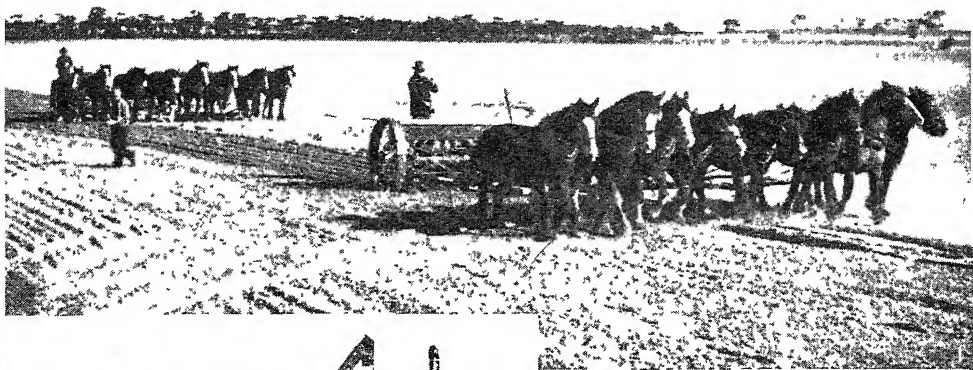
policy, as the one most likely to benefit public health and to bring permanent prosperity and stability to agriculture.

Agriculture and Fisheries, MINISTRY OF. Department for supervising these industries in England and Wales. A Board of Agriculture was established in 1889 to take over duties previously performed by the Privy Council and by the Land Commissioners then abolished. In 1903 the supervision of fisheries was transferred to it from the Board of Trade, and it was known as the Board of Agriculture and Fisheries. It was constituted a ministry in 1919, and on Jan. 9 following its first head was appointed. The minister now holds cabinet rank, is responsible to Parliament, and is assisted by a parliamentary, a permanent, and a second secretary.

For administrative purposes the work of the department is divided into the following categories: (1) Agriculture, including statistics, economics, and trade relations; produce and subsidies; local organization, small-holdings, and allotments; man power and wages; supplies, foodstuffs, livestock, and machinery; land drainage; animal health; technical, education, horticulture, and publications; intelligence; and special inquiries. (2) Wales and Monmouthshire. (3) Fisheries, including scientific investigation. (4) Royal Botanic Gardens, Kew, Surrey, under a director. (5) General, including the establishment and finance divisions and the legal branch. (6) Ordnance Survey, with headquarters at Southampton, under a director-general (a military officer).

Scotland has its own Department of Agriculture, established as a board in 1911 to take over work previously discharged by the Crofters' Commission and the Congested Districts Board. There is also an Inspectorate of Fisheries under the Scottish Home Department. Northern Ireland has a cabinet minister in charge of agriculture. In each of the British Dominions a responsible minister of agriculture is included in the government; and in Canada every province, and in Australia every state, has a similar minister in its cabinet. See Kew Gardens; Ordnance Survey.

Agriculture, CENTRAL AND ASSOCIATED CHAMBERS OF. Society for protecting the interests of agriculture. In England and Wales a central Chamber of Agri-



1. Wheat being sown with machines drawn by teams of eight horses abreast in Western Australia. 2. Feeder belt installed in a combine harvester on a Canadian grain field. 3. Loader with elevator extension for conveying bales of straw. 4. Self-propelled rotary hoe

used to cultivate a 30-acre onion crop in Australia. 5. Fertilisers are applied to pasture on an East Riding farm at the rate of 30 acres a day with this caterpillar tractor and two Bamford manure drills. 6. Combine harvesters at work in an English field

AGRICULTURE : MACHINERY AND METHODS USED IN TILLAGE AND HARVESTING

Photos, 1, Australian Trade Publicity; 2, Canadian Govt.; 3, 5, and 6, "Farmer and Stockbreeder"; 4, Australian Govt.

culture was founded in 1866. With this numerous local chambers are associated. Its avowed object is to watch over all measures affecting the agricultural interests before Parliament, and to take such action, both in and out of Parliament, as may seem desirable for the benefit of agriculture. Agricultural and dairy associations other than local chambers are included in the federation. Scotland is organized on similar lines. In June, 1918, the Council of the Central and Associated Chambers of Agriculture adopted the constitution of a National Agricultural Council, consisting of representatives of the Agricultural Organization Society, the Central Association of Agriculture, the Central Chamber of Agriculture, the National Farmers' Union, and other such bodies.

Agriculture, INTERNATIONAL INSTITUTE OF. Organization intended to provide agriculturists in all parts of the world with a knowledge of crop conditions and supply of farm products (more particularly those which enter into world commerce, e.g. cereals and cotton) that will help them to adjust supply to demand. The idea was conceived by David Lubin, a Californian merchant. Finding little support in the U.S.A., he went to Europe, where he won the sympathy of King Victor Emmanuel III of Italy; and in 1908 the Institute was opened in Rome. Its chief work was the collection of statistics, which were published in monthly bulletins and in special reports. From time to time meetings were held in Rome, under the In-



Agrimony. Flowering spike and leaves of the wayside plant

stitute's auspices, of delegates appointed by the governments forming the union, and before the Second Great War the I.I.A. had come to be widely recognized as the principal source of information on the world's agriculture, seed breeding, soil chemistry, etc.

Agrigento. City and port of Sicily, on the S. coast, known before the Fascist period as Girgenti, and in ancient times Agrigentum or, according to the Greeks, Akragas. Founded by colonists from Gela about 581 B.C., it soon acquired both wealth and territory, and had, it is said, at one time a population of 200,000. Agrigentum had many handsome temples, that of Jupiter being one of the finest in Sicily. The Carthaginians destroyed the city in 405, but it was rebuilt by Timoleon in 340. It was sacked during the first Punic War, and again in 210 B.C. But it remained a great trading centre for several centuries, among the commodities dealt in being sulphur from the neigh-

bouring mines. It has medieval walls, a 14th cent. cathedral, and catacombs. Sulphur, salt, grain, oil, fruit, etc., are exported through Porto Empedocle. During the Anglo-American invasion of Sicily in July, 1943, U.S. warships bombarded Agrigento, and after 24 hrs. of confused fighting, the city surrendered to U.S. troops, July 16. Over 4,000 Italian prisoners were taken.

Agrimony (*Agrimonia eupatoria*). Small perennial herb of pastures and waysides. Its leaves are broken up into pairs of coarsely toothed leaflets, alternately large and small—in botanical language the leaf is interruptedly pinnate. From June to Aug. it sends up a tall, flowering spike, 2 ft. or 3 ft. in height, bearing numerous small yellow flowers and top-shaped fruits with hooked prickles. The rootstock yields yellow dye.

Agrippa. The name of two Idumean rulers of Judaea under the Romans. Agrippa I, grand-



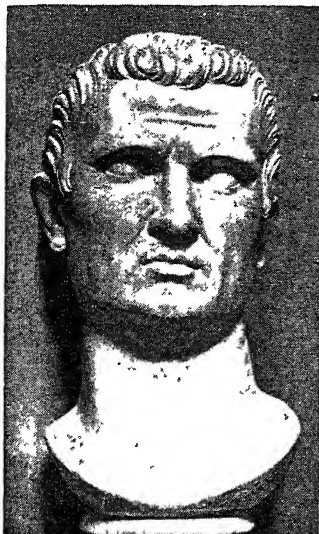
Agrippa I. Coin showing his portrait on the obverse

son of Herod the Great, killed James, son of Zebedee, and cast Peter into prison. He reigned with much pomp and met with a horrible death at Caesarea, described in almost identical terms by Josephus and in Acts 12. His son, Agrippa II, with his sister Berenice, heard Paul's statement before Festus at Caesarea, and was "almost persuaded to be a Christian." (Acts 25-26.) After the fall of Jerusalem he returned to Rome, where he died A.D. 100, the last of the Herodians.

Agrippa, MARCUS VIPSANIUS (63-12 B.C.). Roman general and statesman, friend and confidant of Octavian, afterwards the Roman emperor Augustus. During the civil wars following the death of Caesar, in which Octavian had to fight for the mastery of the Roman world, Agrippa conducted a successful campaign in Gaul in 38 B.C.; effectually checked the menace of Sextus Pompeius by his naval victory at Naulochus in 36; and commanded the fleet at the decisive battle of Actium in 31. His military activity continued after Augustus became emperor,



Agrigento. The Temple of Concord, one of the most perfect of the surviving examples of Hellenic architecture, in this ancient city in Sicily



Agrippa. Roman general
Capitoline Museum, Rome

and he conducted successful campaigns in Gaul, Spain, Pannonia, and Syria. Agrippa was responsible for many public works at Rome and was a generous patron of art and letters. He had much to do with the survey of the empire, begun by Julius Caesar and completed under Augustus. His third wife was Julia, the emperor's daughter.

Agrippina (d. A.D. 33). Called the Elder, she was a daughter of Marcus Vipsanius Agrippa and Julia, daughter of Augustus. A woman of strong character, she shared the hardships of the campaigns of her husband Germanicus, by whom she was the mother of Caligula and Agrippina, mother of Nero. Her popularity is said to have aroused the jealousy of Tiberius, and she was banished to the island of Pandataria, where she died.

Agrippina (c. A.D. 15-59). Called the Younger, she was a daughter of Germanicus by Agrippina the Elder. Her first husband was Gnaeus Domitius Ahenobarbus, by whom she had a son, afterwards the emperor Nero. Later she married her uncle the emperor Claudius and persuaded him to adopt her son, to the detriment of Britannicus, his own son by his former wife Messalina. When Claudius died in 54, it was said he was poisoned by Agrippina. Nero, on his accession, had her assassinated. Agrippina wrote *Memoirs* (*Commentarii*), now lost.

Agronomy (Gr. *agros*, field; *nemein*, to manage). Term applied to that part of agriculture which is concerned with crops. A fully equipped agricultural depart-

ment in a university, or even a farm institute, should employ at least one specialist who is an agronomist.

Aguada. Town on W. coast of Puerto Rico, West Indies, 12 m. N. of Mayaguez. Here Columbus is said to have landed in 1493.

Agua Dulce. City and seaport of Panama. It is situated on the N. shore of Parita Bay, a W. arm of the Gulf of Panama, and is a flourishing commercial city, with sugar and rum distilling industries. Salt is worked.

Aguarico. River of Ecuador. Rising in the Andes, it flows S.E. for 250 m. to join the Napo.

Aguascalientes (Span. warm waters). One of the states of Mexico. Centrally situated on the Mexican plateau, it is named after its warm springs. Cereals, legumes, etc., are grown, stock is reared, and lithographic and building stone, copper, lead, iron, silver, and gold are found. It is well watered, salubrious, and has good rly. communications. Area 2,499 sq. m. Pop. 160,282.

Aguascalientes. Capital of Aguascalientes State, Mexico. It is 365 m. by rly. N.W. of Mexico city and has rly. connexion also with Tampico and the U.S.A. About 6,400 ft. above sea level, it has numerous fruit gardens, cotton and woollen factories and smelting works, manufactures pottery and tobacco, and exports bullion and hides. Pop. 81,124. There is a town of the same name in Peru.

Ague (Lat. *acutus*, acute). Name for acute fevers or affections occurring in paroxysms, such as malaria (*q.v.*); others are Aden ague and brow and face ague. See Dengue; Tic Douloureux.

Aguecheek, SIR ANDREW. A comic character in Shakespeare's *Twelfth Night* (*q.v.*). He is the boon companion of Sir Toby Belch.

Aguesseau, HENRI FRANÇOIS D' (1668-1751). French lawyer. Born at Limoges, he became advocate-general in 1690, procurator-general in 1700, and chancellor in 1717, an office he retained, save for two brief periods, until 1750. He died Feb. 9, 1751. A brilliant orator, he did much to reform the administration of justice.

Aguilar, GRACE (1816-47). English authoress. Daughter of a Jewish merchant, she was born in London June 2, 1816, and lived mostly in Devon. She wrote in defence of the Jewish faith, but is chiefly noted for her novels, *e.g.* *Home Influence*, 1847, and *The Vale of Cedars*, 1850. These dealt sentimentally with domestic life, reflecting a strongly religious temperament. She died while visiting Frankfurt, Sept. 16, 1847. *Pron.* A-ghée-lár.

Aguilas. Seaport and watering-place of Spain, in Murcia province. On the Mediterranean, 40 m. S.W. from Cartagena, it is a rly. terminus, exports iron ore and other minerals, and is the chief outlet for esparto. Pop. 17,000.



Agrippina the Elder. This beautiful example of ancient sculpture has long been traditionally believed to represent the mother of Caligula and grandmother of Nero
Capitoline Museum, Rome

Aguinaldo, EMILIO (b. 1870). Filipino patriot. Born at Cavite, Luzon, of which he was mayor



Emilio Aguinaldo,
Filipino patriot

1893-6, he took a leading part in the insurrection against Spain. In the Spanish-American War he first supported the American forces, but in 1899 led a formidable rising against them. Captured in March, 1901, a month later he formally swore allegiance to the U.S.A. and retired into private life, from which he emerged only for a brief period in 1935, when he stood unsuccessfully as candidate for the presidency of the Philippine Commonwealth.

Aguirre, LOPE DE (1508-61). Spanish pirate. In 1559, after a seafaring life, he joined de Ursua's expedition to the upper Amazon in search of El Dorado. He abetted Guzman in the mutiny in which de Ursua and his lieutenant were killed, and after his own faction was established he contrived the murder of Guzman. An amazing voyage followed, in which the self-proclaimed rebels sailed down the river, looting, murdering, and burning everywhere. They captured Margarita island, killing the governor and robbing the royal treasury. From here Aguirre wrote a letter to the king of Spain accusing him of ingratitude, but soon afterwards was shot by his fellow rebels, Oct., 1561. Southey describes his piracy in *The Expedition of Ursua* and the *Crimes of Aguirre*, 1821. *Pron. Ag-irray*.

Agulhas (Port., needles). Cape of Africa. The southernmost point of the continent, it derives its name from its jagged rocks, and is subject to violent storms. Agulhas Bank extends E. from the cape along the entire coast of South Africa.

Ahab. King of Israel (875-83 B.C.). He succeeded his father Omri (1 Kings 16-22), and by his marriage with Jezebel, daughter of Ethbaal, king of Tyre, was drawn to the worship of Baal and Astarte. When, to secure Naboth's vineyard for him, Jezebel caused Naboth's death, and Ahab hastened to take possession of the land he coveted, he was met by Elijah with the prophecy of his death and the destruction of his house, a punishment delayed by his repentance. In his reign of

22 years he carried on two successful campaigns against the Syrians under Benhadad II, and was slain in a third campaign at Ramoth-gilead by a "certain man" who "drew a bow at a venture." Ahab is the name also of a false prophet burnt to death by Nebuchadrezzar (Jer. 29).

Ahasuerus (c. 519-c. 465 B.C.). King of Persia. He is mentioned in Ezra 4, Dan. 9, and Esther, and is usually identified with Xerxes, son of Darius Hystaspes, but doubt has been thrown on the identity of the Ahasuerus of Dan. 9, since Darius the Mede is unknown to history. Ahasuerus is also the name of the principal character in the legend of the Wandering Jew.

Ahaz. Son and successor of Jotham, king of Judah (2 Kings 16; 2 Chron. 28; Is. 7). He became a vassal of Tiglath-Pileser, king of Assyria, whose aid he had sought against the kings of Israel and Damascus. He reigned for 20 years, about 735-15 B.C.

Ahaziah. Name of two kings mentioned in the O.T. One was son and successor of Ahab, king of Israel (1 Kings 22; 2 Kings 1). He was a worshipper of Baal, and reigned c. 851-49 B.C. The other was son and successor of Jehoram, king of Judah, and of Athaliah, daughter of Ahab (2 Kings 8; 2 Chron. 22), and was slain by Jehu after a year's reign c. 844-3 B.C.

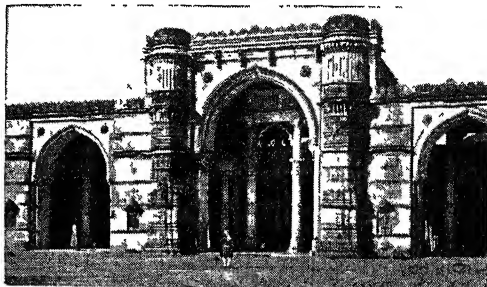
Ahimelech. High priest at Nob (1 Sam. 21-22). For giving David the shew-bread to eat and the sword of Goliath, he and his house were slain by Saul. Another Ahimelech was a Hittite companion of David (1 Sam. 26).

Ahithophel. Friend and counsellor of David (2 Sam. 15-17). He joined Absalom in rebellion, but despairing of success, he "put his household in order and hanged himself."

Ahmad (1898-1930). Shah of Persia 1909-25, last of the Kajar dynasty. Born Jan. 20, 1898, Ahmad became shah when his father, Muhammad Ali, abdicated July 16, 1909, the country being governed by a regent. On July 21, 1914, he was crowned. He remained at Teheran during the First Great War, refusing to be

drawn into hostility to the Allies. Never popular with his subjects, he was deposed in 1925, when Riza Khan became shah. Ahmad died in Paris, Feb. 28, 1930. *See Persia.*

Ahmadabad. Chief city of Ahmadabad district, prov. of Bombay, India. On the Sabarmati river, 309 m. by rly. N. from Bombay, it is an important centre of the cotton industry, and also manufactures gold, silver, and silk thread, pottery, paper, and tin. A walled city, 2 sq. m. in area, it has some fine mosques, the architecture of which often displays a striking blend of Mahomedan and Hindu or Jain styles. Typical examples are the Jama Masjid or Great Mosque, with its decorated minarets, the Ivory Mosque, a marble building lined with ivory and inlaid with gems, and the Jain temple of Hathi Singh.



Ahmadabad. The Jama Masjid, or Great Mosque, a striking example of the blending of Mahomedan and Hindu architecture

Founded in 1412, it was a city of great splendour under the Mogul emperors and capital of the Mahomedan kingdom of Gujarat. Captured by the British in 1780, it was restored to the Mahrattas, but reverted to Great Britain in 1818. Disturbances occurred here in April, 1919, when two government buildings were burned.

The district has an area of 3,815 sq. m. and produces cotton. Pop. of city, 591,267.

Ahmadnagar. Chief town of Ahmadnagar district, prov. of Bombay, India. On the Sina river, it is 218 m. E. of Bombay by the Great Indian Peninsula Rly. A walled city, founded in 1494 and 3 sq. m. in area, it was captured in 1803 by General Wellesley (later the great duke of Wellington). Its manufactures include cotton and silken goods, copper and brass pots. Ahmadnagar Fort, used during the South African War for the internment of Boer prisoners and during the First Great War for that of Germans, lies $\frac{1}{2}$ m. to the E. Pop. 49,878. The district of Ahmad-

nagar, with an area of 6,600 sq. m., is chiefly agricultural and produces pulse, millet, oil-seeds, etc.

Ahmed (1724-73). Ameer of Afghanistan 1747-73. The son of Sammaun, or Seman, Khan, chief of the Abdali tribe, he served in the bodyguard of Nadir Shah. When, in 1747, Nadir was assassinated, Ahmed was acclaimed ruler; he then changed the name of his tribe to Durrani and founded the dynasty of that name. His wealth, which included the Koh-i-nur diamond, and his military talents helped him to popularity, and he made extensive conquests. He captured Lahore in 1748, mastered the Punjab in 1751, conquered Kashmir, and sacked Delhi, but had to yield the Punjab to the Mahrattas and Sikhs.

Ahmed I (1589-1617). Sultan of Turkey. The elder son of Mahommed III, he became sultan in 1603. He carried on unsuccessful wars with Austria and Persia, that against Austria being terminated in 1606 by the peace of Sitvatorok, said to be the first occasion on which the Turks observed the principles of international law in their intercourse with a Christian nation. According to Turkish writers, tobacco was first used in Turkey in his reign.

Ahmed II (1643-95). Sultan of Turkey. He was a brother of Suleiman II, whom he succeeded in 1691. The chief event of his reign was the defeat of the Turks by the Austrians, Aug. 18, 1691, at Slankamen.

Ahmed III (1673-1736). Sultan of Turkey. Brother of Mustapha II, on whose deposition he succeeded in 1703, he was the first sultan to announce his accession to the European sovereigns. In 1709 Charles XII of Sweden, defeated by Russia at Poltava, took refuge in Turkey, and this led to war with Russia in 1710. The war ended a year later, and by the treaty of the Pruth Russia ceded Azov. In 1715 the Morea was seized from the Venetians, but the Turks were defeated by the Austrians at Peterwardein in 1716 and at Belgrade in 1717, peace being concluded with Austria at Passarowitz in 1718. Ahmed was deposed in Sept., 1730, and was kept in prison until his death.

Ahmed Vefik (1819-91). Turkish statesman. Educated in Paris, he was ambassador in Persia 1851-5. In 1860 he went as ambassador to Paris, but was recalled in 1861. From 1879 to 82 he was vali of Broussa (Bursa), in Asia Minor, and his administra-

tion was eminently beneficial. He was twice prime minister of Turkey, and laboured to promote education. A French scholar, he translated Molière into Turkish.

Ahobalam. Village of Madras, India, in Kurnool district. On a neighbouring hill are three pagodas of great local sanctity. One temple contains on its walls, and also on its two great stone porches, which are supported on rock-hewn pillars, beautiful reliefs of scenes from the Mahabharata.

Ahom. Hinduised tribe of Tai origin living in the Brahmaputra valley, Assam. Their native chronicles record their crossing the Patkai Pass in A.D. 1228 into the land named after them Assam. Overthrowing the medieval Chutiya and Koch kingdoms, their domination, culminating in 1700, declined until the British subjugation in 1826. Their Tai speech is all but lost; matriarchy and other primitive customs survive.

Ahriman. Personification of the spirit of evil in the Zoroastrian belief of the ancient Persians and the modern Parsees. Like the Satan of the Bible, he is the chief of a hierarchy of demons of darkness, but, unlike Satan, is regarded as the equal of the creator Ormuzd, orOrmazd, the spirit of good, although before the end of the world he is to be finally subdued. Other forms of the name are Angra Mainyu and Arimanes. See Zoroastrianism.

Ahwaz, AHWAS OR AHWUZ. Town of Persia, in Khuzistan district. It stands on the river Karun, 70 m. N.E. of Basra, and is notable for the neighbouring ruins of the capital of Artabanus, the last king of Parthia. In the war with Persia, 1857, it was captured by the British. During the First Great War the British occupied Ahwaz in order to protect the oil wells of the Anglo-Persian Oil Company. It was again occupied by a British force in Aug., 1941, when armed intervention by British and Russian troops removed the danger of Nazi control in Persia. Ahwaz was subsequently used as an important clearing-station for British and American war supplies on the way to Russia. A new rly. to Ahwaz from Khorramshahr (near Basra) was constructed for the purpose. Pop. 30,000.

Ai OR HAI. Royal city of the Canaanites, E. of Bethel (Gen. 13; Josh. 7-8). The Israelites were smitten here after the fall of Jericho. With its inhabitants it was utterly destroyed by Joshua.

Aicard, JEAN FRANÇOIS VICTOR (1848-1921). French poet. Born at Toulon, Feb. 7, 1848, he achieved recognition with *Les Rébellions et les Apaisements* (1871). Other works include *Miette et Noré* (1880) and *Jésus* (1896). He also wrote plays and novels. He died May 13, 1921.

Aichi. Japanese aircraft-manufacturing concern which built dive-bombers used in the Second Great War.

Aich's Metal. A brass alloy of the same group as Muntz metal (*q.v.*), containing 60 per cent copper, 38.5 per cent zinc, and 1.5 per cent tin or iron.

Aida. An opera by Giuseppe Verdi (*q.v.*). It was written to the commission of the Egyptian government for the opening of the Cairo opera house and first performed there in Dec., 1871. The setting is ancient Egypt, and the libretto, by Ghislanzoni, was based on a theme suggested by Mariette Bey, the French Egyptologist. The music, rich and dramatic, belongs to the composer's middle period. In Feb., 1872, Verdi conducted the first Italian performance at La Scala, Milan. The opera was first performed at Covent Garden June 22, 1876.

Aidan (d. 651). Saint and Apostle of North Britain. He was a monk of Iona and was sent to Northumbria at King Oswald's request. There he won the people to Christianity, and was consecrated first bishop of Lindisfarne in 635. He made this place the centre of his missionary work, and when Oswald died his successor Oswy protected him. He died at Bamborough, Aug. 31, 651.

Aide-de-camp. Word, of French origin, applied to an officer who serves a general or a governor in a personal capacity. In times of peace his functions are secretarial and domestic. In war he arranges for the comfort of the commander, and sometimes acts as camp commandant at headquarters, supervising the batmen, drivers, clerks, etc. In Great Britain certain colonels are appointed as aides-de-camp to the King, an honorary distinction in most cases. An aide-de-camp is designated by the letters A.D.C.

Aidin OR GÜZEL-HISSAR. Town of Turkey, in the vilayet of Aidin. It stands 81 m. by rly. S.E. of Izmir. Built near the ruins of ancient Tralles, it makes leather and is noted for its sweetmeats, olive oil, fruit, and cotton. It suffered by an earthquake in 1899. Pop. of the vilayet, 281,784; town, 70,000.

Aiding and Abetting. In law, the act of encouraging anyone to commit a crime by expressions, gestures, or actions intended to signify approval. A great authority, Mr. Justice Hawkins, laid it down that mere passivity cannot be aiding and abetting. "It is no criminal offence," he said, "to stand by, a mere passive spectator of a crime, even of a murder. Non-interference to prevent a crime is not itself a crime." Aiding and abetting is a crime varying in degree of penalty with the crime that is aided and abetted. It is a contempt of court to aid and abet a contempt of court. Thus, when a sheriff's officer, in the execution of his duty, is assaulted, and someone standing by cheers on the assaulter, both the aggressor and the encourager are "in contempt."

Aids. Payments made in feudal times by vassals to the king, barons, and other overlords, the equivalent of the taxes of to-day. The Latin word for aid in this sense was *auxilium*, help.

At first in England the kings and barons collected aids as often as they could, but by the time of Henry I the number of times they could lawfully do this had been reduced to three: (1) when the eldest son was knighted; (2) when the eldest daughter was married; (3) when the king or lord himself needed ransom. These were the regular feudal aids. But the kings did not confine themselves to three aids, hence in Magna Carta King John was forbidden to collect any except the regular aids, unless with the consent of the council. In 1275 the amount of a feudal aid was fixed at 20s. for each knight's fee, and from time to time these were collected until the reign of James I, who took the last on record in 1613. The term aid was also used

in the time of the later Plantagenet kings (1272-1377) for other taxes—for the tax paid to the king by the towns, for money paid in lieu of military service, and for that paid to sheriffs for their own use. See Taxation.

Aigburth. Southern residential suburb of Liverpool, England. Its railway station is called Mersey Road and Aigburth. One of the Lancashire county cricket grounds is here. Sefton Park lies to the north. See Liverpool.

Aigrette. French name for the egret, the smaller white heron with a tufted head plume. In England the word was used for the plume once fashionable in millinery, also called osprey (*q.v.*). The plucking of the plumes involves the death of the bird during the nesting season, and importation into the U.K. is now illegal.

Aiguebelle. Village of France, in the department of Savoie. Situated 15 m. by rly. E. of Chambéry, and near the beginning



Aigrette, or egret, the small white heron with tufted head plume

connected by canal. Louis IX embarked here in 1248 and 1270 for the Crusades. Its well-preserved walls and towers were built about 1280. It carries on trade in coal, fruits, wine, and fish, and makes soda. Pop. 4,330.



Aigues-Mortes. Famous fortifications of the old French town of that name in the department of Gard. They were built about 1280

of the Mt. Cenis road, it was the scene of a defeat, in 1742, by French and Spanish of Sardinian forces.

Aigues-Mortes (Lat. *aguae mortuae*, dead waters). Old fortified town of France, in the department of Gard. It is 24 m. by rly. S.S.W. of Nîmes, and 3 m. from the Mediterranean, with which it is

Aiguille (Fr. needle). Name for a bare needle-shaped pinnacle of rock standing above the snow-line. Such pinnacles are formed by the action of frost causing granite or other crystalline rocks to split along joints or planes of cleavage. The use of the word is almost confined to the Alps.

Aiguillettes or **AIGLETS** (Fr. *aiguille*, needle). Metal tags or points sheathing the ends of ties, prevalent chiefly in the dress of the 16th and 17th centuries. These ties were used in great profusion as ornaments and as substitutes for buttons when passed through eyelet holes. Apparently in the time of Shakespeare aiglets, as they were then called, often consisted of little figures of gold or silver. Survivals are to be seen on the shoulders of naval and military uniforms.

Aiguille Verte. Mountain of France. E. of Chamonix, it is a peak of the Mont Blanc chain, 13,540 ft. high, first ascended by Edward Whymper (*q.v.*) in 1865.



Aiguille Verte. Peak in France, belonging to the Mont Blanc chain. It is the highest point to the left, and is 13,540 feet high

Aigun OR SAKHALIN ULA. Town of Manchuria. On the right bank of the Amur river, it is 18 m. S. of Blagoveshtchensk. It trades in grain, tobacco, and mustard. Here was concluded, May, 1857, a treaty whereby China ceded to Russia the left bank of the Amur. Pop. 38,112.

Aikawa. Town on the W. coast of Sado Island, Japan. It is 40 m. W.N.W. of Niigata, and to the N.E. is the famous Sado gold mine, discovered in 1601. Silver is also worked, and the town has ore reduction works.

Aiken, CONRAD POTTER (b. 1889). American poet. Born at Savannah, Ga., August 5, 1889, he graduated at Harvard in 1911. His first book of poetry, *Earth Triumphant and Other Tales*, appeared in 1914; and it was followed by many other volumes of verse and literary criticism, as well as a novel and short stories. From 1917 to 1919 he contributed to *Dial*, and in 1930 he was awarded the Pulitzer prize for the best volume of verse.

Aiken, FRANK (b. 1898). Irish politician, born Feb. 13, 1898. Active in the Irish Volunteers, 1914, he commanded the northern division of the I.R.A. in 1921, and was I.R.A. chief of staff 1923-25. He played a part in the negotiations resulting in the establishment of the Free State in 1922. Member of the Dáil for Louth from 1923, he was minister for defence, 1932-39, for coordination of defence, 1939-45, and for finance, 1945-48.

Aikenhead, MARY (1787-1858). Irish philanthropist. Born Jan. 19, 1787, eldest daughter of a Protestant doctor of Cork, she became a Roman Catholic when in her teens and entered a convent at York. Returning to Dublin, she founded the Congregation of the Irish Sisters of Charity, the first of its kind in Ireland, and was appointed its supreme general. Although almost bedridden for many years, she eventually superintended eight convents, an asylum for penitents, and a hospital in Dublin, the first hospital in Ireland to be served by nuns. She died July 22, 1858.

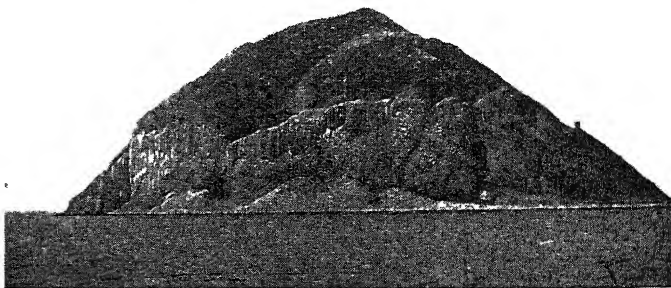
Aikenhead, THOMAS (c. 1678-97). Scotsman hanged for blasphemy. Born in Edinburgh, the son of an apothecary, he was accused of expressing contempt for the Scriptures and theology generally. He recanted, but being tried under a statute declaring blaspheming of any Person of the Trinity punishable by death, was hanged at Edinburgh, Jan. 8,

1697, after declaring full adherence to the Christian faith. *Consult* State Trials, XIII.

Aikin, JOHN (1747-1822). English author. Born at Kibworth-Harcourt, Jan. 15, 1747, he qualified as a physician, and from 1792 practised in London. A friend of Southey and Priestley, he produced in collaboration with his sister, Anna G. Barbauld, several popular books, including *Evenings at Home*, 1795. He also wrote a number of biographies. He died Dec. 7, 1822.

Ailantus OR TREE OF HEAVEN. The tree is a native of North China, whence it was introduced

the right aileron is moved downwards. The result is that the "angle of attack" to the airflow over the wings is reduced on the left and increased on the right. It follows that the left wing loses some of its lift and drops while the right wing rises as its lift is increased. The opposite effects are produced when the control column (or wheel) is moved to the right: the left aileron is then pulled down and the right aileron is moved up. Movement of the aircraft brought about by actuation of the ailerons is in that which is called the rolling plane. The other control surfaces



Ailsa Craig. Basaltic rocky islet in the Firth of Clyde, Scotland. It rises 1,140 ft. above the sea level. See p. 136

to Europe in 1751. In some places it is extensively planted as a shade tree. Its compound leaves are from 2 ft. to 6 ft. long, and may be mistaken for leafy branches. The flowers are small, greenish-white, and evil-smelling. The botanical name is *Ailantus* or *Ailanthus glandulosa*, and it belongs to the family Simarubaceae. The larva of the *Ailanthus* silk-moth feeds on the plant.

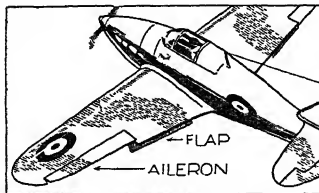
Aileron (French, wing tip). The hinged surface fixed to the trailing edge of aircraft wings to provide lateral control. Fitted near the wing tips, the ailerons are interconnected, usually by cables, and are moved by means of the control column ("joystick") in the pilot's cockpit. When the column is drawn to the left, the left aileron is moved upwards and

of a machine are the elevator and the rudder. The former gives control in the pitching plane and the latter in the yawing plane. See *Aeroplane*.

Ailesbury, MARQUESS OF. British title borne since 1821 by the family of Brudenell-Bruce. The family is descended from Thomas Brudenell, a younger son of the earl of Cardigan, who was made earl of Ailesbury in 1776. He was a nephew of Charles Bruce, 4th earl of Elgin, who made him his heir; hence the name of Brudenell-Bruce. The 2nd earl was created a marquess, and in 1868 the 2nd marquess inherited the title of earl of Cardigan, since used for the heir to the marquessate. The 6th marquess (b. 1873) succeeded his father in 1911. Savernake Forest, in Wiltshire, is the property of the family.

Ailette. River of France, in the department of Aisne. A left-bank tributary of the Oise, it was the scene of much fighting during the First Great War.

Ailly, PIERRE D' (1350-1419). French theologian and philosopher. Born at Compiègne, he became chancellor of Paris University in 1389, bishop of Cambrai in 1396, and cardinal in 1411.



Aileron. Hinged surface fitted to the rear edge of an aircraft wing in order to provide lateral control

Known as the Hammer of Heretics, he presided as papal legate at the council of Constance. From one of his works, *Imago Mundi*, Columbus was inspired to seek a western passage to Asia. As a philosopher, he was a nominalist.

Ailsa, MARQUESS OF. Scottish title dating from 1831 and borne by the family of Kennedy. The first Lord Kennedy, Gilbert, ennobled 1452, was one of the regents of Scotland during the minority of James III. The 3rd lord, made earl of Cassilis in 1509, was killed at Flodden in 1513; the 3rd earl was poisoned in France while arranging the marriage between Mary Queen of Scots and the Dauphin. The 12th earl was made marquess of Ailsa. The 5th marquess was born in 1875 and succeeded his brother in 1943. The family seat is Culzean Castle, Ayrshire, and the eldest son is known as the earl of Cassilis.

Ailsa Craig. Rocky islet in the Firth of Clyde, Scotland, 10 m. W. of Girvan. Rising 1,140 ft., it is composed largely of a form of columnar basalt which affords material for curling-stones. The island has a lighthouse, built in 1836. See illustration, page 185.

Aimak. Semi-nomad tribal group in the N.W. highlands of Afghanistan. Of Mongol stock, tracing descent from the Tartar hordes which overthrew the Caliphate in the 13th century, they speak a Persianized dialect.

Aimard, GUSTAVE (1818-83). French novelist, whose real name was Olivier Gloux. He shipped to America as a cabin-boy, and there passed ten years among the Red Indians, afterwards seeking adventure in Spain and Turkey. In 1848 he returned to Paris and served as an officer in the Garde Mobile, and in 1870 he organized and commanded the francs-tireurs of the press. He died in Paris, June 20, 1883. His adventure stories resemble those of James Fenimore Cooper (*q.v.*), and many of them have been translated into English.

Ain. River of France. Rising in the Jura Mts., near Nozeroy, it flows 119 m. W. and S. to join the Rhône 18 m. above Lyons.

Ain. Department of E. France. Between the Rhône and Saône rivers, and bordered N.E. by the Swiss cantons of Vaud and Geneva, it has an area of 2,248 sq. m. and is traversed by the river Ain. A centre of pastoral and agricultural activity, it yields bituminous limestone, from which Seyssel asphalt is made. The

chief towns are Bourg, the capital, and Belley. Pop. 316,710.

Ainger, ALFRED (1837-1904). British divine and man of letters.



Alfred Ainger
Elliott & Fry

Born in London, Feb. 9, 1837, he was educated at King's College, London, and Trinity Hall, Cambridge. Ordained in 1860, in 1865 he became reader at the Temple Church, and in 1887 canon of Bristol. In 1894 he was chosen master of the Temple. He is chiefly known as the biographer and editor of Charles Lamb, and his friends included Charles Dickens, Leslie Stephen, and Tennyson. He died Feb. 8, 1904, at Darley Abbey, near Derby.

Ainley, HENRY HINCHLIFFE (1879-1945). British actor. Born at Leeds, Aug. 21, 1879, he was a bank clerk before he went on the stage. After touring with Sir Frank Benson he made his first appearance in London at the Lyceum Theatre in 1900, and subsequently became one of the leading character actors on the British stage by his performances as Ilam Carve in *The Great Adventure* (1913) and Joseph Quinney in *Quinney's* (1915). In 1919 he became joint manager of the St. James's Theatre, London, and from 1920 to 32 appeared with conspicuous success in many of the leading plays of the day, notably in *Flecker's Hassan* (1923), *The First Mrs. Fraser* (1929-30) and *The Anatomist* (1931), and in many films. He was also distinguished in Shakespearean parts, among his finest interpretations being those of Mark Antony in *Julius Caesar*, and Hamlet. Owing to severe illness he left the stage for six years in 1932, but began broadcasting regularly in 1937. Radio proved an ideal medium for his exceptionally melodious speaking voice. He died Oct. 31, 1945.



Henry Ainley.
British actor

Ain Sefra. Territory and village of S. Algeria. The territory is traversed by the Saharan Atlas range. The village has rly. communication with Oman and other seaports on the N. coast. Pop. of territory 193,347.

Ainsworth, WILLIAM HARRISON (1805-82). British novelist. Born in Manchester, Feb. 4, 1805, the son of a solicitor, and educated at Manchester Grammar School, he was at first intended for his father's profession. He studied at the Inner Temple, but soon tired of the law and settled down in London as an historical novelist and magazine editor. His first success was *Rookwood*, 1834, and the last of his 39 novels, *Stanley Brereton*, was published in 1881.



W. Harrison Ainsworth
Portrait after D. Macise, R.A.

The Tower of London, 1840, *Old St. Paul's*, 1841, and *The Lancashire Witches*, 1848, are among his best works. From 1842-1853 he edited

Ainsworth's Magazine and for some years later *The New Monthly Magazine*. He died at Reigate, Jan. 3, 1882. See W. H. Ainsworth and his Friends, S. M. Ellis, 1911.

Aintree. Parish of Lancashire, England, a suburb of Liverpool, with a rly. station. The Leeds and Liverpool Canal passes across the racecourse, over which is decided annually (usually in March) the Grand National steeplechase.

Ainu or **AINO**. Primitive race of Caucasian stock inhabiting the Kurile Islands, Yezo and S. Sakhalen, but now rapidly dwindling towards extinction. Once occupying all Japan—and so recorded in native literature from 700 B.C. onwards—they appear to represent an early Caucasian stream, although when they reached Japan they encountered a still older aboriginal race of pit-dwellers and builders of kitchen-middens, wherein chipped stone implements and rude pottery have been found. Their name of the hairy Ainu is derived from their black wavy hair which is allowed to grow on head and chin, and involves the use of moustache-lifters (*ikubashi*).

Their primitive dress is a kimono-like robe of woven bark-cloth; their personal ornaments are largely of Japanese derivation. Occupying roomy reed-thatched huts, with separate storehouses on stilts, they are essentially hunters and fishers, using a detachable harpoon and cooking all animal food. Until recently their scanty cereal crops were reaped by mussel shells. Their

agglutinative language, clearly primitive, with no living analogies, is richly developed, a vocabulary of 14,000 words having been compiled. Their animism includes a complex nature-worship of the sun, fire, lightning, and rivers, and a system of magico-religious "message-bearers" loosely comparable with African fetishism. These are usually formed of wands hung with willow shavings, and set up at the east end of the living-room. Their ceremonial bear feasts are designed to offer divine honours to the victims, whose skulls are afterwards erected on village poles. Consult The Ainos D. MacRitchie, 1892; Alone with the Hairy Ainu, A. H. Savage Landor, 1893; The Ainu and their Folk-lore, J. Batchelor, 1901.

Air. As applied to the atmosphere we breathe the word denotes a mixture of gases surrounding the surface of the earth. Fresh country air consists of approximately 20.93 p.c. oxygen, 79.04 p.c. nitrogen. There is also present a small quantity of carbon dioxide which amounts to 0.03 p.c. in country air and approximately 0.04 p.c. in town air. A variable amount of water vapour is also present, the actual amount depending upon climatic conditions and on the locality. In addition there may be present in the air very small quantities of ammonia, sulphuretted hydrogen, sulphurous acid gas, and floating organic and inorganic matter, such as dust. See Atmosphere.

AIR AND PUBLIC HEALTH. An abundant supply of pure air is of the greatest importance in maintaining health. If the lungs are weakened by the effect of continually breathing impure air, they are apt to become the seat of tuberculosis or other disease.

Air may be vitiated or rendered unsuitable for breathing mainly by the following causes: (1) in rooms, by respiration and the burning of gas for heat or light; (2) in factories and workshops, by certain trade processes; (3) in towns, by smoke from chimneys and dust from streets.

AIR IN ROOMS. It was long believed that the injurious effects of ill-ventilated rooms were due to diminution of oxygen owing to its absorption in the process of breathing and the respiration of carbon dioxide gas. The air expired by human beings contains approximately 4.5 p.c. of carbon dioxide. In one hour an average man will exhale 0.6 cubic feet of carbon dioxide, so that in a closed



Ainu. Group consisting of an Ainu man with his son and four women. The women have tattooed marks round their mouths. Above, Ainu man and his wife

gas-tight compartment measuring $10 \times 10 \times 10$ ft. the air would be vitiated by one individual to the extent of 6 parts of carbon dioxide per 10,000 of air at the end of an hour. This led to the old-standing recommendation that the carbon dioxide in room air should not exceed 0.06 p.c.

It follows that if the carbon dioxide in the air of a room is kept down to this level there must be a good supply of fresh air ventilating the room. It must not be thought, however, that carbon dioxide itself is harmful in such small concentrations. In fact, it has been shown by Prof. Leonard Hill that a man can breathe 2 p.c. carbon dioxide in the air without experiencing discomfort. Usually, however, a high concentration of carbon dioxide in a room indicates stagnation of the air, which Prof. Hill showed to be the chief cause of discomfort experienced in a badly ventilated room. Satisfactory

air conditions in a room are not only a question of the purity of the air in respect of a low concentration of carbon dioxide. A human being is continually producing heat which must be lost to its surroundings if the body temperature is to be kept normal. Heat is lost by radiation to cool surroundings, by conduction (warming the air near the skin), and by evaporation of sweat. Hence the temperature, movement, and humidity of the air affect our bodies by virtue of their cooling effect.

AIR IN FACTORIES. Government regulations in regard to the purity of air in factories are strict. Pro-

vision must be arranged for securing and maintaining a suitable air temperature and effective ventilation. The air should be changed sufficiently often by the admittance of fresh air, impurities, unpleasant odours, and dust being intercepted. A satisfactory rate of air movement in the vicinity of a worker tends to ward off oppressive conditions and the relative humidity to create a feeling of comfort.

Special requirements apply to various types of manufacture. For example, all woodworking machines should be installed with mechanical exhaust fans, ducts, and hoods, by which sawdust and shavings are picked up at the machines and delivered at a point where they can be collected and used or destroyed. Grinding and polishing machines require to be treated in a similar manner so that dust is carried away from the worker and deposited in a settling

tank or receiver. Fumes from galvanising tanks, type-casting machines, and cellulose spray-painting also require to be exhausted by fans so that the workers shall not inhale dangerous particles or fumes.

AIR IN TOWNS. In industrial towns the air is most likely to be vitiated by solid particles, sulphurous acid and noxious gases contained in smoke from factories and private houses, and fumes from motor traffic. The regulations in regard to emission of smoke from factory chimneys are very definite, as shown by the following extracts from the Public Health (Smoke Abatement) Act:

"A chimney (not being the chimney of a private dwelling house) sending forth smoke in such quantities as to be a nuisance shall be deemed to be a nuisance liable to be dealt with summarily in manner provided by the Act, notwithstanding that the smoke is not black smoke . . .

"The expression 'smoke' shall include soot, ash, grit and gritty particles . . .

"The expression 'chimney' shall include structures and openings of any kind whatsoever capable of emitting smoke . . .

"Any local authority may, and if so required by the Minister of Health, shall, make by-laws regulating the emission of smoke of such colour, density or content as may be prescribed by the by-laws, and where such by-laws are in force the emission of smoke of the character so prescribed for such period as may be prescribed in the by-laws."

Contamination of the air by smoke has been considerably reduced by many factories now being provided with electric power for driving the machines, thus allowing the number of solid fuel burning boilers to be reduced. Smoke from private houses would be much reduced if central heating were adopted, as less fumes pass to the chimney through a well-designed hot water boiler using coke or anthracite as fuel.

L. J. Overton, M.I.H.V.E.

Air. In music this has several meanings, apart from the chief one of melody or tune. It means the highest or principal part in concerted music for voices or instruments; a simple song-like movement in a 17th or 18th century suite—which consisted otherwise mainly of dances—in which sense it is sometimes spelt *ayre*; and a similar movement in suites by Bach and his contemporaries of a

somewhat broader style and of weightier import.

Airacobra. A single-seat fighter aircraft manufactured by the Bell Aircraft Corporation of Buffalo, New York. Designated the P-39, this machine was of novel design. One of its most striking features was the position of the engine. This was mounted behind the pilot and drove the tractor airscrew by means of a shaft. A 37-mm. or 20-mm. shell-firing cannon was installed so that it could be fired through the airscrew hub, and machine-guns were mounted in the wings. It had a retractable tricycle undercarriage and stout armour plate was fitted around the cockpit. A low-wing monoplane, it had a wing span of 34 ft. and a length of 29 ft. 9 ins. Fully loaded it weighed 7,379 lb. The engine was a 1,150 h.p. liquid-cooled twelve-cylinder Allison. The prototype was built in 1939 and

ultimately a few machines were supplied to the Royal Air Force. The Airacobra was also used by the Red Air Force.

Airacomet. Name given to the P-59a fighter aircraft constructed by the Bell Aircraft Corporation of Buffalo, N.Y., U.S.A. It was the first reaction-propelled aircraft to be produced in the U.S.A. A mid-wing all-metal monoplane, it is powered with two gas turbine units manufactured by the General Electric Co. to the design of Air Commodore Frank Whittle, inventor of the jet-propulsion engine. The engines are installed in streamlined housings arranged below the wings and at their roots. The span is 48 ft., and the length 38 ft. 2 ins. The undercarriage is of the tricycle type and is retractable. Quickly outclassed by the Lockheed P-80 Shooting Star, the Airacomet was adapted and retained by the U.S.A.A.F. only as a fighter-trainer.

AIRBORNE FORCES AND OPERATIONS

MAJ.-GEN. R. N. GALE, C.B., D.S.O., O.B.E., M.C.

This article deals authoritatively and fully with the strategic and tactical uses of an essential feature of modern warfare, as developed during the Second Great War. See under Arnhem; Crete; D-day; Rhine; Rotterdam, etc., also under Parachute; Glider, etc.

The term airborne forces has by usage come to be applied to those forces which are transported by air to the battlefield. The term is thus not applicable to troops that are merely transported by air from one base of operations to another; nor is the term normally applied to those that are flown in to airfields as reinforcements. Airborne troops include parachute troops and airlanding troops. The former, as their name implies, land with all their equipment by parachute: the latter are landed normally in gliders, though they may be landed in aircraft if the terrain is suitable. The airlanding troops are more heavily equipped than the parachute troops, including in their armaments all types of anti-tank equipment, many types of vehicle, and light tanks.

Parachute troops have to be extremely fit and exceptionally self-reliant. The shock of landing is equivalent in effect to that of a free jump of 10 to 14 ft. or a rate of descent of approximately 20 m.p.h. However, because of special physical training and the development of a good technique, this produces an extremely small casualty rate. With winds of over 20 m.p.h. and on bad ground the casualty rate will obviously tend to increase. Parachute troops have to be prepared to act

quickly without previous reconnaissance, and on landing are often very scattered.

Glider-borne troops arrive in tactical sub-units, as each glider is designed to carry such units. The glider will carry heavy supporting arms and technical equipment and can land in comparatively high winds. They will land where there are no airfields and have often been successfully put down when it would be suicidal to land a powered aircraft.

The silent approach of a glider is one of its more important characteristics. The Germans exploited this in their assault on Fort Eben-Emael, Belgium, May 11 1940, and the British in their glider-borne *coup-de-main* parties in the assaults on the bridges over the Orne river on the night of June 5-6, 1944.

In this, however, as in any other operation of war, it is not in the copying of successful stratagems that success will lie, but in the learning of the lesson that surprise in method, in equipment, in tactics and in armament can teach; for surprise is the very essence of successful airborne attack.

Airborne forces are organized in divisions which, like normal infantry divisions, include a proportion of all arms. It thus follows that

they are capable, when on the ground, of playing their part as a normal division in battle. After landing, they may be supplied by air, either by parachute or by glider, or once they have linked up with the ground armies of their own side, they may be supplied over the ground. Airborne divisions may be grouped together as an airborne corps, and airborne corps may be grouped to form an airborne army.

The prerequisite for the employment of airborne forces is the possession of a reasonable degree of air superiority. In all forms of modern battle the first task that confronts the supreme commander in a theatre is to secure some degree of air superiority; without this no land battle can be won. Airborne forces are in this respect similar to the rest of the army; for against their extreme vulnerability while airborne it may well be possible to obtain a degree of local air superiority for a limited period of time.

The two principal adversaries confronting airborne troops are the enemy's fighter planes and his anti-aircraft fire. The night approach may defeat the day fighter, but leaves the column vulnerable to the night fighter, and technique in the development of defence against the night fighter is only in its infancy. Anti-aircraft fire can be doused by long-range artillery, by bombing, and by direct air attack. Bombing tends to crater ground on which it may be desired to land gliders. It also creates haze through which the landing of gliders may be so

hazardous as to preclude the use of the bomb weapon.

An airborne operation is, in fact, a combined operation of the first magnitude and is, so far as the airborne aspect of the plans is concerned, an air staff responsibility. This responsibility will include such action as the bombing of enemy airfields known to contain fighters which might interfere with the airborne convoy; the bombing and ground "strafing" of enemy anti-aircraft positions over the target areas; and the provision of a fighter escort during the approach. The army commander assumes control, of course, once the troops are landed.

The precise composition of the force to be employed, the order in which it is to land, and the precise areas where each unit is to be dropped are of vital importance to the army commander. All these matters will, however, have their reaction on the air plan. In this, as in a combined sea landing on the beaches, there must be a large measure of mutual understanding and give-and-take between the air and army commanders. It is noteworthy that in the Second Great War the commanding general of the 1st Allied airborne army was a U.S. Army Air Force officer, while his deputy was a British major-general.

The total number of aircraft required for a division is great, and the total number of troops and equipment to be lifted will often be in excess of the air lift. The assembly of a large airborne force in the battlefield will thus rarely be completed in one lift. In

planning for subsequent lifts the rate of enemy build-up *versus* the rate of airborne build-up will therefore determine the method by which the airborne troops can best be reinforced.

Airborne forces are mobile forces. They may be employed to seize ground vital to the advance of the main army; to secure ground as a pivot for manoeuvre; by direct assault, to overpower hostile defences; to complete annihilation of a defeated and retreating enemy; to seize airfields for the reception of ordinarily air-transported troops; or to disrupt enemy communications and cause confusion in his command by cutting telegraph lines and assaulting headquarters. They may, in fact, be used in mass for a major assault, as in the Rhine crossing, March, 1945, or in comparatively small parties as guerrillas behind the enemy lines.

Airborne forces can be landed either by day or by night. Modern scientific methods enable accurate flying to be carried out in conditions of darkness, and the development of the bomber technique for finding difficult targets can permit the dropping of parachute troops as accurately by night as by day. The Allied landing in Normandy in June, 1944, was carried out by night, the landings at Arnhem, Sept. 17, 1944, and in the Rhine crossing of March, 1945, were carried out by day. The Germans in Norway, Holland, and the Balkans used their airborne troops in the early hours of the morning. The British raid at Bruneval, Feb. 27-28, 1942, was carried out at night. The landings in Sicily, July 10, 1943, were carried out at night.

Another interesting element in this question of timing is: should the assault precede the main military operation or take place after this has opened? A blow delivered at an unexpected moment might well find an otherwise prepared enemy off his guard.

Airborne operations carried out during the war against Germany were remarkable for their diversity in conception and plan. The Germans in Norway in April, 1940, used one company of their 1st parachute regiment at Dombas to seize the railway station and close the road to the British. Casualties were heavy, but the experience undoubtedly helped the Germans in their later employment of this arm. In Holland in May, 1940, the Germans used it to capture the bridges of the



Airborne Forces. British parachute troops bound for Holland in a C-46 transport aircraft to take part in the Arnhem landings on Sept. 17, 1944

Photo, British Official



Airborne Forces. U.S. army parachutists jumping from a low altitude under cover of a smoke screen laid by bombers, during operations against the Japanese occupying New Guinea in 1942

Rhine and Maas and to seize the aerodrome at Rotterdam. This plan was put into execution with great skill, the airfield being seized by the early morning of May 10, 1940. A considerable number of troops were landed during the ensuing days. At Fort Eben-Emael the Germans carried out their first glider-borne operation. Here gliders were actually landed on the super-structure of the fort, and later the German troop carriers arrived and dropped their parachute troops. It is difficult to assess what a direct assault by ordinary ground troops on this fort might have cost the Germans: it certainly could not have been seized more economically.

The German landings on Crete in May, 1941, were carried out on a mass scale against little or no serious opposition. Here the plan was to use parachute troops to disorganize communications and interfere with the machinery of the British command, as well as to seize airfields on which troop-carrier aircraft were to land. The British possessed scarcely any anti-aircraft defences, and fighter cover was almost non-existent. So disproportionate were the strengths of the two sides that little can be learned from this operation.

Between this enterprise and the Allied use of airborne forces the balance of air power swung from the Germans to the Allies. British operations developed from the successful raid on Bruneval in 1942 by a company of parachutists, to the mass landings of

the Allies over the Rhine in March, 1945. They were used with success, but not on a large scale, in the landings on Sicily and again in the battle for the Anzio beach-head, Jan. 22, 1944; but it was not until the invasion of Normandy that really large-scale operations were undertaken. Here the British 6th division landed before the seaborne assault on the night of June 5-6. They secured high ground east of the river Orne, and held this ground, which was a pivot of the British 2nd army manoeuvre, for as long as three months; and finally drove the Germans back to the Somme.

Arnhem, the most spectacular and ambitious operation, was carried out by an airborne corps under Lieut.-Gen. F. A. M. Browning. They seized bridges at Eindhoven, Nijmegen, and Arnhem, laying as it were a carpet some 60 m. long down which the British 2nd army advanced. The heroism of these troops at Arnhem in the gallant part they played, and the failure of the 2nd army to make contact over the last river, has sometimes obscured the success of the remainder of this great operation; for it was the action of the airborne troops at Eindhoven and Nijmegen which facilitated and, indeed, made possible the advance of the 2nd army from the Belgian frontier to the very outskirts of Arnhem itself.

Airborne divisions did not confine themselves to airborne operations. The 6th British airborne division was reported as fighting

from D-day to the end of the war with Germany. The U.S. 101st airborne division won undying fame in the Bastogne battle in Jan., 1945.

The German parachute divisions, as they were called, fought continuously in the line. The last action in which they were used as airborne troops was in Rundstedt's offensive in the Ardennes in the winter of 1944-45. Here the German hand seemed to have lost its cunning, for these ventures achieved little or no success.

Air Chief Marshal. Title held by an officer in the R.A.F. It is the second highest in the service, the highest being Marshal of the Royal Air Force. It corresponds to admiral in the Navy and general in the Army. The rank is indicated when service dress uniform is worn by one broad ring of braid with three narrow braid rings on the sleeves of the tunic and on the shoulder straps of the great-coat. This rank with others was instituted in Aug., 1919, sixteen months after the Royal Naval Air Service and the Royal Flying Corps were merged to form the Royal Air Force.

Air Commodore. Title of an officer of the Royal Air Force which is equivalent to that of Commodore, 2nd Class, in the Royal Navy and Brigadier in the Army. The rank is indicated by a broad ring of braid on the tunic sleeves and shoulder straps. Before it was instituted in Aug., 1919, officers who had reached such status in the Royal Air Force

which was formed in April, 1918, carried either the naval or military titles according to whether they had served previously in the Royal Naval Air Service or the Royal Flying Corps. The W.R.A.F. equivalent is air commandant.

Air Conditioning. System by which the air in a room or building is rendered and maintained in perfect condition suitable for the comfort and health of persons in occupation. It also applies to obtaining the exact temperature and relative humidity of the air required in a room or factory when special materials are in the process of manufacture or kept in storage. For cinemas, theatres, and public halls air conditioning plants are in some districts compulsory, and many hotels provide this method of warming or cooling and ventilating in their principal rooms. Rly. coaches in the U.S.A. and elsewhere are also air conditioned.

An air conditioning plant provides that the incoming fresh air is cleansed, warmed or cooled to a definite temperature, humidified or dehumidified, and, if required, treated chemically to disinfect or deodorise. Complete air conditioning should control simultaneously temperature, humidity, volume, air movement, air distribution, and the elimination of dust, bacteria, odours, and toxic gases. Taking, for example, a suitable air conditioning plant for a cinema, a centrifugal fan capable of delivering 1,000 cubic feet of fresh air per hour per person (according to seating accommodation) discharges conditioned air through sheet metal or built ducts into the building. The fresh air is drawn from outside the building, and passes through a filter consisting of perforated metal trays coated with viscous oil. These trays are easily cleaned when dust accumulates on them. The air then passes through the air conditioning chamber, which is built of light metal sheets, enclosing steam or hot water batteries of special radiators or gilled pipes for warming the air, and water sprays for washing or cooling and humidifying, while for special cooling a refrigerating coil may be incorporated in the conditioning chamber. Automatic controls may be provided to regulate the temperature of the air delivered and the relative humidity, also to regulate the supply of steam or temperature of the water in the heater batteries. Extract ventilation at about 75 per cent of the volume

of air delivered may be used in conjunction with the air conditioning plant.

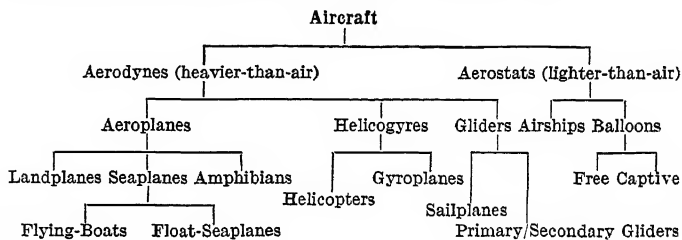
A small all-electric air conditioning unit is obtainable for use in single rooms. Contained in a neat casing are a motor-driven fan, a box filter, an electric heating element, a water tank with electric immersion heater to humidify the air, and a compressor refrigeration plant for cooling.

L. J. Overton

Air Council. The controlling authority of the Air Ministry. The Council supervises all matters relating to the Royal Air Force and the defence of the realm by the exercise of the country's air power. The president is the secretary of state for Air; the vice-president is the parliamentary under-secretary of state for Air; the remainder of the Council consists of nine service officers; the chief of air staff, the vice-chief of air staff, the air member for per-

sonnel, the air member for supply and organization, the air member for training, the air member for technical survey, two additional members, and the permanent under-secretary of state for Air.

Aircraft. Comprehensive term applied to every type of flying machine. In modern times it is normally employed to describe a power-driven, pilot-controlled, heavier-than-air machine, i.e. an aeroplane, but it is applicable to airship, balloon, glider, or helicopter. When the Germans introduced their flying bomb in the Second Great War this projectile was designated by the British Air Ministry the "pilotless aircraft," and later classified as a "guided missile." The later V2 was rocket-propelled, in a sub-division (as are jet-propelled aircraft) of the reaction-propulsion class. See the table below: also under Aeroplane; Airship; Flying Bomb; Glider etc.



AIRCRAFT CARRIER: TYPES AND USES

Capt. Norman Macmillan, M.C., A.F.C.

This article deals with developments in the design of aircraft carriers 1917-45, with their strategical and tactical deployment in war, and explains fully how carrier-borne aircraft are operated from the parent vessel. See also Fleet Air Arm

In the earliest days of naval flying, officer pilots of the Naval Wing, Royal Flying Corps, the forerunner of the Royal Naval Air Service, realized that their *métier* was air-cooperation with ships; and almost as soon as they had learned to fly, they sought means to use their aeroplanes from ships. Their experimentation took two lines: (1) development of seaplanes that could be flown from water, and hoisted outboard and inboard by parent ships called seaplane carriers; (2) flying landplanes from ships. It was the continuation of the second line of experimentation that brought about the aircraft carrier, a type of ship pioneered by the Royal Navy.

EARLY HISTORY. In 1911 Lt. C. R. Samson (one of the first four naval pilots) designed and had built in Chatham dockyard a double trackway for aeroplanes. It was erected in H.M.S. Africa,

and Samson took off from it in Dec., 1911. The platform, erected forward of the superstructure, could not be used for alighting. Airbags were therefore fitted to the undercarriages of early ship aeroplanes so that they could alight on the water alongside the parent ship. But this was unsatisfactory. It was realized that it was essential for the aeroplane to be able to alight on board a ship if it was to serve the real needs of the navy.

Flt. Comdr. E. H. Dunning piloted the first plane to alight on board the ship from which it was launched. On Aug. 2, 1917, he made a skilful landing in a Sopwith Pup on the forecable launching deck of H.M.S. Furious while she was under way. Five days later, during a second attempt, the Pup rolled off the deck, fell into the sea, and Dunning was drowned. The Furious was then fitted with a landing deck aft.

On July 19, 1918, aeroplanes flown from this ship destroyed a Zeppelin shed at Tondern. The *Furious*, originally designed as a cruiser (1916), underwent yet a third conversion. In 1925 she was commissioned as a flush-deck aircraft carrier. In her first conversion she carried 8 aircraft (Pups and Short seaplanes); in her second she carried 16 aircraft (Sopwith Camels and $1\frac{1}{2}$ -Strutters); in her third conversion she carried 33 aircraft, and in this form continued in commission and served in the Second Great War.

H.M.S. *Argus* was the first aircraft carrier with a flush deck; and the first to embark (Oct. 19, 1918) a squadron of torpedo-carrying aeroplanes. Her complement was 20 aircraft.

The *Furious* and the *Argus* were the only real aircraft carriers (as distinct from parent ships) in commission during the First Great War. They were followed between the two Great Wars by the *Eagle*, *Hermes*, *Courageous*, *Glorious*, and *Ark Royal* (completed 1919, 1923, 1928, 1930, and 1938, and carrying 21, 15, 48, 48, and 60 aircraft respectively). The speed of these aircraft carriers varied from the 20 knots of the *Argus* to the 31 knots of the *Furious*.

Other Countries

The Royal Navy, having pioneered the aircraft carrier, was followed by other nations' fleets. Japan's first aircraft carrier, the *Hosho*, was converted in 1922, to be followed in 1927, 1928, and 1933 by the *Akagi*, *Kaga*, and *Ryujō*. In 1921 the U.S. Navy fleet-collier *Jupiter* was converted to an experimental aircraft carrier and rechristened the *Langley*; she had a flush flight deck, and carried 30 aircraft; her speed was 14.9 knots. The first U.S.N. Fleet aircraft carriers were the *Lexington* and the *Saratoga*, both converted from battle cruisers under the Washington Treaty. They were completed in 1927, had a speed of 33.35 knots, and carried 72 aircraft. The *Ranger*, launched 1933, was the first U.S.N. aircraft carrier to be so designed from the outset. The first R.N. aircraft carriers so designed were the *Hermes* and the *Ark Royal*.

When the Second Great War began, there were 23 aircraft carriers in service in the world: U.K., eight; U.S.A., seven; Japan, seven; France, one (the *Béarn*, converted in 1927 to carry 36-40 aircraft, with a ship speed of 21.5 knots). The German *Graf*

Zeppelin, launched in 1938, was never completed; she was designed to carry 40 aircraft, with a ship speed of 32 knots.

AIRCRAFT OPERATION. Airfield runways are measured in yards, are seldom less than 800 and may be 3,000 or more yds. long. Aircraft carrier flight decks are measured in feet, are seldom more than 800 ft. in length, and, in the smaller classes of ships (escort and merchant aircraft carriers) may be about half that length. Aircraft flying from aircraft carriers must therefore become airborne during a relatively short run, the maximum length of which is arbitrarily fixed by the dimensions of the flight deck. Rapid acceleration is important, and engine reliability fundamental, for once the take-off run has begun it is seldom feasible to stop and try again.

Pre-determined Wind-speed

To overcome the runway handicap and enable the pilot to start his flight with assurance, it is necessary to establish artificial take-off conditions on the flight deck. Basically, this is achieved by creating a pre-determined wind-speed over the deck, to suit the particular aircraft and the load it carries. Advantage is taken of the natural wind, and the aircraft carrier steams head into wind during all flying-off operations. In conditions of calm, fast carriers, with speeds of about 30 knots, can operate their aircraft by steaming at or near full speed. The slower carriers may not be able to get enough wind-speed over their decks in these conditions, and other means must be sought to enable their aircraft to take off.

The wind-speed flowing over the flight deck gives the aircraft the equivalent of a running start. If, for example, an aircraft becomes fully airborne and controllable at 70 knots air speed, and is subject to a wind of 30 knots while stationary on the flight deck, it need only accelerate to 40 knots relative to the deck to obtain the necessary 70 knots relative to the air. So, when steaming into wind of sufficient strength, carriers can take advantage of the conditions to reduce speed and conserve the ship's fuel, consumption of which increases rapidly at or near maximum speed.

In aircraft powered with supercharged engines pilots can use the supercharger for the few seconds of take-off to obtain

additional power for the period of acceleration from the standing start to the fully airborne condition and its succeeding initial climb. When absence of wind, or the shortness of the deck run, or the weight of the load carried by the aircraft, or any combination of these three conditions makes the ordinary take-off too hazardous, recourse may be had to accelerators.

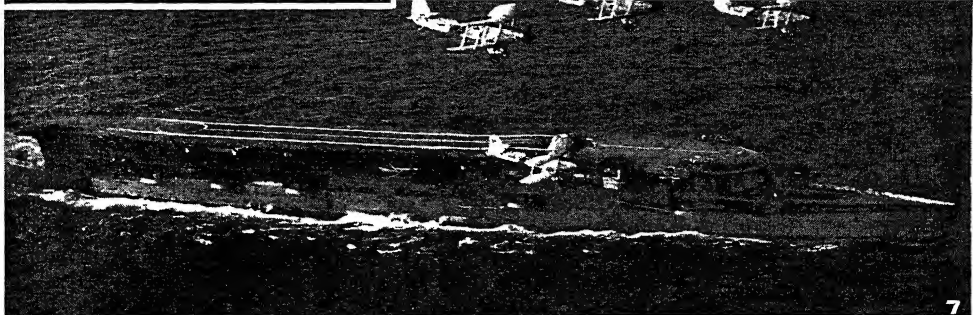
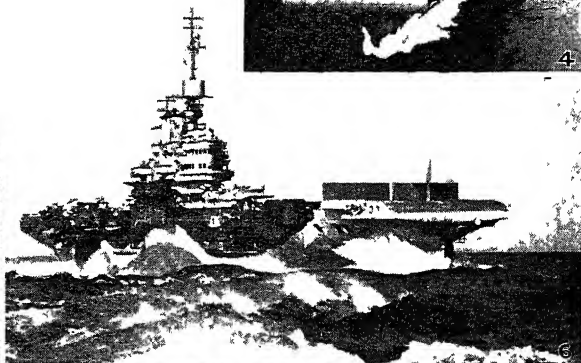
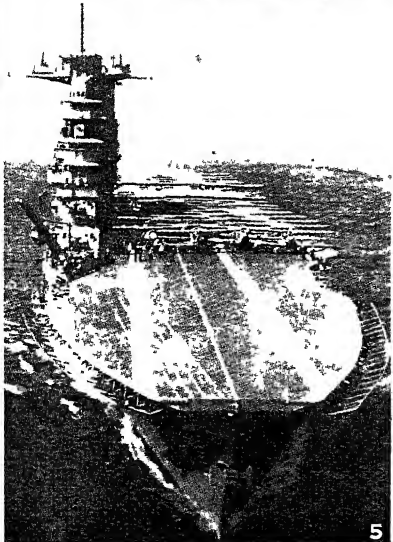
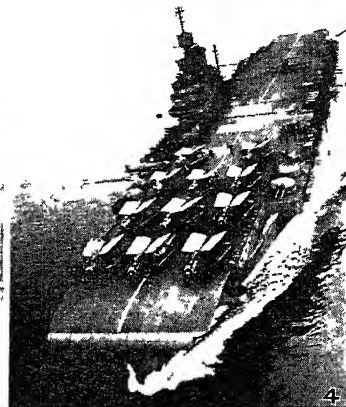
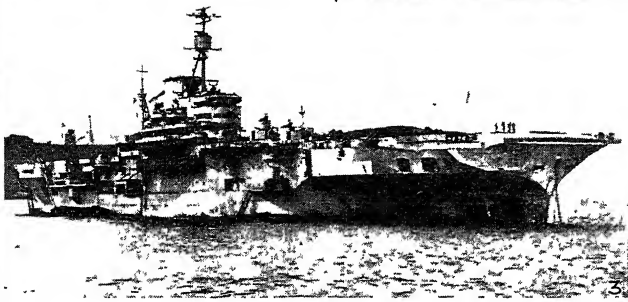
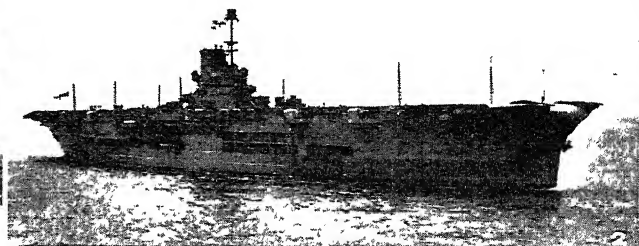
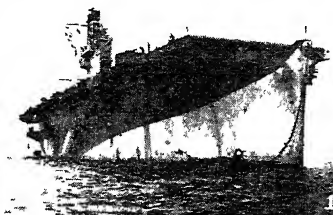
ACCELERATORS. Accelerators are of two kinds, one external to and the other integral with the aircraft. The first kind is the catapult. In the earlier form of catapult the aeroplane to be launched was mounted on a trolley which ran along rails. The trolley was propelled by a ram operated by either compressed air or the gas pressure of a special cordite cartridge; the second method became the standard. For many years these catapults were used on aircraft carriers; they are part of the equipment of other types of warships that carry aircraft, e.g. battleships and cruisers; they were used in the catapult aircraft merchant ships that preceded the merchant aircraft carriers. At $2\frac{3}{4}$ G (gravity) acceleration these catapults launch landplanes and seaplanes from rest to flying speed (about 60 knots) in 30 feet.

These catapults obstructed the decks of aircraft carriers, and a later form placed the mechanism under the flight deck. A cable running within a slotted rail provided the means to apply power to the aircraft through a strop attached to the undercarriage. This unobstructive form of catapult applied the same accelerative force to a landplane taking off on its own undercarriage.

Rocket Assisters

Rocket assisters were later employed to provide additional power for take-off. Mounted below the wings, close to the fuselage, they are ignited electrically by the pilot during his take-off run, and give additional propulsion by jet reaction for four seconds, enough to complete the take-off run and start the aircraft on its initial climb. The number of rockets (i.e. the propulsive force) is varied according to the type of aircraft and the conditions of deck-length, wind-speed, and load.

LANDING-ON. Landing on a ship's deck has always been regarded as more hazardous than taking-off, and much care has been devoted to improving this



1 H.M.S. Battler, pocket carrier designed for convoy escort work. 2. Ark Royal; completed 1938, she had engaged in 32 war operations before her loss in Nov., 1941. 3 and 4. Implacable and Indomitable

*two of Britain's newest carriers 5 Saratoga U.S. carrier adapted from a battle cruiser 6. H.M.S. Formidable, which played a vital part at Matapan 7. H.M.S. Furious with unique retractable navigation bridge

AIRCRAFT CARRIER: VARIED TYPES FROM THE BRITISH AND U.S. NAVIES

Photos, 1, Central Press; 2, Wright & Logan; 3 and 6, British Official; 4, Planet News; 5, U.S. Navy Official; 7, Charles E. Brown

operation. Wind-speed of sufficient strength and a true fore-and-aft air-flow over the deck are essential. The ship must therefore steam into wind, irrespective of the course of other ships which may accompany the carrier. Mechanical means have been devised to arrest the aircraft when it alights on the deck, and four stages of R.N. arrester gear development can be distinguished. These are as follows:

(1) Cables laid transversely across the deck with filled sand-

engaging mechanism on the aircraft is a landing hook, carried beneath the after part of the fuselage and lowered by the pilot when required. The pilot approaches in a curving flight to keep the deck in view, straightening into wind and deck just above and behind the stern. The relative correctness of his approach is signalled to the pilot visually by means of two bats, of table-tennis shape, handled by the deck flying control officer (the "batsman"). It is often easier to judge an

aircraft carriers were of different design, although some sister ships existed, notably the *Courageous* and *Glorious*, and the *Saratoga* and *Lexington*. The first aircraft carriers to be laid down (1937) for the R.N. as a class were the *Illustrious*, *Victorious*, *Formidable*, and *Indomitable*. These ships, like their predecessors, were fleet carriers—ships of 23,000 tons, capable of over 30 knots, carrying 16 4.5-in. dual purpose guns, and considerable deck and side armour to take knocks in addition to giving them. To compensate for their heavier armour they had one hangar for aircraft instead of the two superimposed hangars of the *Ark Royal*. Such ships are costly—the *Ark Royal* cost £3,500,000—but what is more important in war, they take some years to build. The Second Great War provided the first real experience of aircraft carriers in active service, and it became apparent that a sufficient number of units could not be provided in the large fleet carrier class to deal with the manifold duties of the air component of modern marine power. As a result, four distinct classes of aircraft carrier emerged. These were: (1) the fleet carrier; (2) the light fleet carrier; (3) the escort carrier; (4) the merchant aircraft carrier. The M.A.C.s were solely British. After three years' experience of war the U.S.N. laid down another class, a heavy fleet carrier with a displacement of over 45,000 tons, designed to carry larger types of aircraft.

Variations in British and American carrier design in armament, ship speed, armour, equipment, and the exact number of aircraft carried per ship produce additional sub-divisions among the carriers in each class; but it can be assumed that M.A.C.s carry one flight of aircraft; E.C.s two squadrons; L.F.C.s two to three squadrons; and F.C.s three to six squadrons.

Certain features are common to all aircraft carriers. Their superstructure is carried on the starboard side of the ship, and in the later ships is built out to offer the least restriction to the width of the flight deck, while remote control, applied whenever possible, is used to keep the dimensions of the superstructure to the minimum. Radio telephony and wireless telegraphy are used for communication between aircraft and carrier, ship and ship, and ship and shore. Direction-finding radio is used to give aircraft homing



Aircraft Carrier. Approaching with flaps and undercarriage lowered and arrester hook extended, a fighter pilot receives the land-on signal from the batsman
Photo, British Official

bags attached to either end; these cables, entangling in the undercarriage and tail-skid, helped to retard the aeroplane.

(2) Fore and aft cables, held a few inches above the deck by stanchions, to engage in special hooks carried on the fixed undercarriages of the aircraft. The hooks had non-return spring jaws to retain the cables. The purpose was to keep the aircraft on the deck once it landed, prevent it from swerving, and arrest its speed by friction between cable and hook. This gear was not a success.

(3) A period when no mechanical deck arrester gear was employed. Wheel brakes had then become common to all aircraft, and were used both to arrest the aircraft and to control it directionally during the landing-on.

(4) Transverse arrester cables controlled by hydraulic braking mechanism below the flight deck. The number of arrester cables varies in different ships, but four is the minimum. For take-off conditions the cables lie flat on the deck; for landing-on they are raised to a suitable height above the flight deck by hydraulic rams, two to each cable. The

approach from the deck than from the aircraft, and a good "batsman" gives valuable guidance to the pilot.

When the hook engages a cable, the aircraft is brought rapidly to a standstill. Although comparatively smooth, the braking is powerful, and the air crew must brace themselves to resist the inertia forces affecting them during the landing. This is the standard method of deck landing in the R.N. and U.S.N.

In the earlier period of deck landing, nets and palisades were erected along the sides of the flight deck to prevent aircraft from falling overboard; these are no longer used, but transverse crash barriers are fitted in many carriers to safeguard aircraft parked on the forward part of the flight deck from collision with aircraft failing to land-on or take-off, and to prevent aircraft failing to hook-on from running over the bow. Wind brakes are sometimes fitted to give protection to aircraft parked on the flight deck.

For types of ship planes, see table of aeroplanes on page 136.

SHIP DEVELOPMENT. Before the Second Great War almost all

bearings on the ship. In most ships radio beacons enable pilots and aircraft wireless operators to determine the approximate directional position of the carrier. All the naval carriers are equipped with radar, which, as on land, enables the approach of enemy aircraft to be detected, so that counter measures can be taken for the defence of the carrier or fleet against air attack; the same means can be employed to detect enemy ships and organize an aircraft strike against them.

In addition to the captain, who is responsible for the whole ship, and the commander (executive), who is responsible to the captain for the ship's affairs, an aircraft carrier has a commander (flying), who is responsible for the aircraft side of the ship's activities, and an air staff officer who is responsible for the organization of the air operations detail. There are briefing and intelligence rooms for the air crews; an operations room for the control of all operational air activities; readiness rooms for air crews; chart room and chart store (charts are greatly multiplied, for every aircraft must be supplied with charts, and not only the ship, as in other categories of naval craft); photographic section and meteorological office.

On the air operational side an aircraft carrier has to be just as fully equipped as any shore operational air station.

Ship's Complement

The complement of an aircraft carrier is large, for in addition to the ship's company there are the air crews, aircraft mechanics, and the aircraft handlers who are the flight-deck crews. In the larger carriers the officer complement is from 50 to 100 per cent greater than in battleships and cruisers.

Embodied in the ship's company and equipment are to be found the usual components of a big ship—chaplain, schoolmaster, ship's stores, workshops, blacksmith, carpenter, paintshop, surgeon, operating theatre, and sick-bay; engineers for the main engines, the hydraulic machinery, compressors, electrical generating plant, refrigerating plant, stokers (who are boilermen in oil-fired ships), electricians; galleys (electrified and very modern with monel metal fittings and electric hot cupboards); and canteen with, in some ships, a cafeteria. The hangar has a secondary use as a cinema. Lifts convey the aircraft from hangar to deck and vice

versa. The lift well provides additional stowage space. M.A.C. grain ships have a lift; M.A.C. tankers have no lift, and their aircraft remain on deck throughout.

The lighter classes of carrier are constructed on merchant ship lines. Their engine-rooms are laid out as in the Merchant Navy, and are properly called machinery space. Naval carriers, like other large warships, contain a damage control room, a centralised action station coordinating the safety measures in a crippled ship.

Since full administrative and operational control over the Naval Air Arm was returned to the Board of Admiralty in 1938, all the personnel of the Air Branch have belonged exclusively to the Royal Navy. All the ships' companies are also R.N., except in the merchant aircraft carriers, wherein the ships' crews are Merchant Navy, and in the escort carriers, wherein the engineers are Merchant Navy incorporated within the Royal Naval Reserve.

CARRIER STRATEGY AND TACTICS. Aircraft carriers are not now, as formerly, concerned only with safeguarding sea communications, but must also play their part in combined operations to give cover to the army before and after a landing, spot for ship's guns providing such cover, undertake visual and photographic reconnaissance for the army and the covering ships, and provide mobile fire power through their aircraft with bomb, rocket fire, cannon-gun, and machine-gun. Such actions, in cooperation with the army, or when deployed against enemy land targets in task force duties, can be maintained at high pressure only for relatively brief periods because of the supply position in aircraft, petrol, bombs, and other material, and must be prepared for in advance. In this respect the aircraft carrier operation differs from that of a land-based air force, such as a Bomber Command, whose function is to maintain continuous operations. But aircraft carriers can operate for long periods at low pressure activity. Their use thus falls into a strategic category which offers the elements of mobility of base, power of concentration of effort, surprise, and capacity of manoeuvre to avoid counter-attack.

The element of surprise is increased by the ability of the aircraft to operate from carriers at night, an air operation carried out in R.N. carriers either as prac-

tice or in exercises during the decade preceding the outbreak of the Second Great War.

The several types of aircraft carrier, with their varying speeds and ranges of action, different qualities of armour and ship's armament, and their capacity to carry the appropriate types of aircraft for specific duties, gave navies a new striking force which did not diminish but augmented their power in fleet actions, and enabled them not only to control the seas, but to dominate the once-feared coastal batteries and carry naval fire-power deep into enemy land territory.

Following the defeat of the Japanese naval elements in the battles of the Coral Sea, Midway, and the Philippines, and the continuous war of attrition in the Pacific, aircraft carrier supremacy passed in 1944-45 almost exclusively into the hands of the U.S. Navy and the Royal Navy, and for several years at least this predominance in naval air strength should remain unrivalled.

Aircraft Constructors, Society of British. An organization formed in 1916 by the principal aeroplane manufacturers of Britain to develop coordination in all matters of common interest. The full title of this body is the Society of British Aircraft Constructors, Ltd., and the offices are at 32, Savile Row, London, W.1. It has become the governing body of the British aircraft industry and, being recognized as such, has the cooperation of the Royal Aeronautical Society and the Royal Aero Club. Before the Second Great War the Society sponsored an annual display of military and civil aircraft at which prototypes and standard production machines were demonstrated before foreign diplomats, air attachés, and trade representatives. In the later phase of the war it took steps to formulate a comprehensive plan whereby the industry would maintain the position it had secured in world aviation. Amongst the essential factors which were investigated were the establishment of a wide scheme for training in aeronautical engineering and a cooperative effort in scientific research and development.

Aircraft Escort Vessel. A class of ship introduced in the Second Great War to ease the situation in air-sea warfare when the employment of the U-boat and long-range aircraft by the enemy was intensified and seriously jeopardised Allied shipping.

A joint effort was launched by Britain and the United States to provide aircraft-carrying ships for convoys both by building these in British yards and by a large-scale conversion plan in America. The latter consisted in converting merchant ships into escort carriers. Great Britain produced the merchant aircraft carriers by the addition of flight decks on grain ships and oil tankers.

The first converted merchantman to go into service was the German ship *Hannover* which had been intercepted by H.M.S. *Dunedin* in March, 1940. A flight deck 450 ft. long and 60 ft. wide was built on her. Six Martlet shipboard fighters were carried aboard her, these being lashed to the deck as no hangar was provided. This ship, re-named *Audacity*, was sunk by enemy torpedo in the Bay of Biscay, December, 1941.

A great fleet of escort carriers was built by the United States, more than eighty having gone into service before 1944, and 38 were supplied to Britain under Lend-Lease, the Anglo-American scheme which came into operation in 1941. The length of these ships was about 500 ft. and the tonnage approximately 10,000. Hangar accommodation was built into the vessels so that they could each take 12 to 20 aircraft. They also had the "island control" (i.e. control of navigation, gunnery, flying, and radar centralised in a superstructure on the starboard side of the flight deck) and anti-aircraft armament.

The term aircraft escort vessel quickly became obsolete. See *Aircraft Carrier*.

Aircraft Establishment, ROYAL. Known as the Royal Aircraft Factory before the R.A.F. assumed the same initials this establishment, comprising numerous engineering workshops, an experimental and research department, aircraft hangars, and an aerodrome, was set up by the Government in the early days of flying, at Farnborough, Hampshire. Before the First Great War work was carried out there in the development of man-lifting kites, balloons, airships, aero-engines, aeroplanes, and wireless. Before and during the 1914-1918 period the prototypes of numerous aeroplanes were designed and built at this factory. Amongst the more renowned of these were the B.E., for which Sir Geoffrey de Havilland was responsible, the F.E., the R.E., and the S.E. types. The R.E.8 became

the standard artillery-observation machine used by the Royal Flying Corps in France until the end of the war in 1918, and the S.E.5 was one of the best scout (known later as fighter) aeroplanes of its time. R.A.F. 90 h.p. and 140 h.p. engines which were employed extensively in the First Great War emanated in the first place from the factory at Farnborough.

Between the wars the establishment continued to function, as an experimental and research station. Theoretical and practical work was done in the development of four-engined bombers and monoplane fighters, while the design of navigation and bombing instruments was revolutionised. Important tasks of the Second Great War were the development of airborne radar and improvement in air frames and engines for high altitude flying. In 1942 the first British jet aircraft was flight-tested here, and after the war improvements to guided missiles were made.

Aircraft Industry. Britain's first aeroplane factory was opened 1908 (see *Aeroplane*). British aircraft manufacturers established before the First Great War and still existing include A. V. Roe, Blackburn, Bristol, Handley Page, Short, Sopwith (now Hawker). On March 29, 1916, the Society of British Aircraft Constructors was founded. Many new firms entered the rapidly growing industry during that war, and some of these continued in it thereafter. The S.B.A.C. now includes in membership every established aircraft and aero-engine manufacturer in Britain,

and the majority of the suppliers of aircraft parts, materials, instruments, and accessories.

In May, 1935, when the Air Ministry expansion programme "E" began, the industry employed about 22,000. The government shadow factory scheme was instituted April, 1936. In 1938 employment was about 100,000. On May 14, 1940, the Ministry of Aircraft Production was formed. Persons employed by this supply department in Jan., 1944, numbered 1,821,000. This made aircraft manufacture the leading war industry in the U.K. Annual British aircraft production figures (excluding repaired aircraft and spares) were: 1936, 1,830; 1937, 2,218; 1938, 2,827; 1939, 7,940; 1940, 15,049; 1941, 20,094; 1942, 23,672; 1943, 26,263 (7,129 of these were four-engined heavy bombers). Total for the whole war period, 1939-45: 125,500.

The U.S. aircraft industry in Aug., 1944, employed 1,910,000. From July 1, 1940, to the end of 1944, it produced 246,845 aircraft. Of these, 28,471 were heavy bombers. Figures of output of new aircraft do not, however, form the only basis for comparing production in British and U.S. war-time aircraft industries. The British industry was organized to repair aircraft and to provide spares on a scale never attempted in America. In the last year for which figures were available, 18,000 aircraft were repaired and returned in new condition, while spares production equalled between 50 and 60 p.c. of new aircraft output. The total British effort in that year was equivalent



Aircraft Industry. One of the great workshops in which were built up the fuselages of the Hurricane fighters, which helped to win the Battle of Britain in 1940

to the production of some 60,000 new aircraft.

Canada's aircraft industry employed 122,765 in 1943. Production of aircraft was in 1940, 846; 1941, 1,697; 1942, 3,811; 1943, 4,133.

Aircraftman. The lowest rank in the Royal Air Force is aircraftman 2nd class. Immediately above this rank are aircraftman 1st class and leading aircraftman (L.A.C.). In peace-time promotion to 1st class takes place after 6 months' satisfactory service as aircraftman 2nd class, and to L.A.C. after one year's satisfactory service as aircraftman 1st class. Pay varies according to the trade group in which the aircraftman is classified. A leading aircraftman wears a propeller badge on the arm.

Aircraft Production, MINISTRY OF. Government organization set up in Great Britain in 1940 to supervise to the fullest extent the manufacture of aircraft of all types. This ministry also exercised powers in connexion with the production of materials, accessories, units, and parts associated with aircraft built, assembled, and repaired in this country. Aircraft research and development in the Second Great War were carried out by a department of the ministry, this highly-specialised work including the examination, dismantling, and reconstruction of enemy aircraft that had fallen into our hands. It also controlled the civil organization, the Air Transport Auxiliary, which was formed in Sept., 1939, for the purpose of delivering aircraft from factories and depots to the R.A.F. and Fleet Air Arm. The first minister of Aircraft Production was Lord Beaverbrook. His successors were J. T. C. Moore-Brabazon, later Lord Brabazon of Tara; Col. J. J. Llewellyn; Sir Stafford Cripps; and Ernest Brown. In the Labour Government of 1945 the ministry was merged with that of Supply, under John Wilmot.

Aircraftwoman. Equivalent rank in the Women's Auxiliary Air Force to that of aircraftman in the Royal Air Force. An aircraftwoman may be 2nd class, 1st class, or a leading aircraftwoman (L.A.C.W.). Promotion in peace-time takes place at the same rate as for an aircraftman (*q.v.*), and pay varies in the same way, according to trade.

Air Crew. The flying personnel of the Royal Air Force, Fleet Air Arm, and other air ser-

vices. An air crew may consist of a pilot and observer-navigator or of captain, second-pilot, engineer, navigator, bomb aimer (known in U.S.A. as bombardier), wireless-operator, and three or more air gunners.

Air Crew Europe Star. British decoration of the Second Great War, its institution was announced May 18, 1945. It is an award for operational flying from U.K. bases over Europe from Sept. 3, 1939, to June 5, 1944. The ribbon, designed by King George VI, is light blue with black edges and a narrow yellow stripe at each side. The star, of yellow copper zinc alloy, is identical in shape with the seven other campaign medals of the Second Great War. See Campaign Stars.

Aird, Sir John, BART. (1833-1911). British contractor. Born in London, Dec. 3, 1833, Aird

joined his father as a contractor, and the firm soon built up a flourishing business. Having



Sir John Aird,
1st Baronet
Russell

erected the Crystal Palace in 1851, the Airds undertook the construction of railways, docks, etc., not only in England, but nearly all over the world, and after the

father's death the son was even more prosperous. In 1898-1902 he constructed the great dams at Assuan and Assiut on the Nile. From 1887 to 1905 he was Conservative member of Parliament for North Paddington, London, and in 1901 he was made a baronet. He died Jan. 6, 1911.

AIR DEFENCE: PRINCIPLES & METHODS

This description of how one of the major problems of total warfare was faced is written with the full authority of the Air Ministry. For further relative information see under Air Raids; Anti-Aircraft Command; Balloon Defences; Britain, Battle of; Fighter Command; Flying Bomb; Radar; Royal Air Force, etc.

The three cardinal principles of air defence are warning of attack, interception of raiders, and counter-bombing of enemy air bases. Enormous advances in method have been made since the First Great War, but these principles have remained the same.

Although the first German bomb fell on British soil in Dec., 1914, enemy airships continued throughout 1915 to attack without serious opposition, and it was not until the spring of 1916 that the defences noticeably improved. Warning of approach was the first to be systematically organized. Observer posts were sited at suitable points round the coast and occasionally out to sea. They relied on the human eye aided by binoculars, night glasses, and telescopes, and on devices to amplify the sound of enemy aircraft and enable their direction to be judged. Communication was by telephone to a central control.

Definite attempts to organize the warning system as part of a comprehensive air defence organization including fighter aircraft, anti-aircraft guns, and searchlights, were not made until the summer of 1917, when the reversal of the German attack to bombing aeroplanes after the failure of the Zeppelin raids made it imperative that the defence of London should be more effective.

The formation of a separate air defence command for London produced such an improvement that in the autumn of 1917 the Germans turned to raiding by night instead of by day.

At first the most effective form of defence at night was found to be the "box barrage," in which A.A. guns concentrated a cone of fire round an attacking force with the intention of forcing it to fly through the gunfire at some point. Later, methods of interception at night with the aid of searchlights were evolved, and in the biggest German raid, that of May 19, 1918, out of 40 Gothas which attacked London three were shot down in air combat and three by anti-aircraft guns. The armistice of Nov., 1918, found London with 284 guns, 377 searchlights, and 11 fighter squadrons.

In Sept., 1939, guns, fighters, and searchlights still formed part of the defence, but the discovery of radar (*q.v.*) had vastly altered the picture. In the First Great War the human eye and ear, instrumentally aided, were the only means of discovering hostile aircraft. From the earliest days of the Second Great War, Great Britain had in readiness a system of detecting aircraft before they came within human sight or sound. Air defence could now be regarded as in five stages: radar, giving the earliest warning of approaching

aircraft; observers plotting their course overland; fighters attempting to intercept; guns, aided by searchlights, trying to shoot them down; and finally barrage balloons preventing accurate bombing of the target itself. Smoke screens, camouflage, and decoy targets combined to make accurate bombing more difficult. The effectiveness of all these stages of defence depended largely on the first—the early warning of approach.

Radar stations positioned round the coast were able, under favourable conditions, to detect German aircraft even before they crossed the enemy-held coast. They were able to give the course, speed, height, and approximate number. At the start of the war the system covered only the approaches to London, but it was later extended to other vital parts of the coast.

Observation Posts

Once overland, the spotting and plotting of the enemy raider became the responsibility of the Observer Corps, which in April, 1941, became the Royal Observer Corps. The corps consisted of about 32,000 personnel, of whom 23,000 gave spare-time service. Each received special training in the observation, identification, and plotting of aircraft. They manned more than 1,000 R.O.C. posts situated round the coasts and vantage points inland.

Observation posts were equipped with instruments for spotting aircraft and measuring height, speed, and course. This information, together with the number of aircraft and an indication whether they were friendly or hostile, was passed by telephone to an R.O.C. centre. The average centre served between 30 and 40 posts, forming an R.O.C. group. Between them the groups covered the whole of the U.K.

The information from the R.O.C., together with that from the radar network, was combined and passed to the operations room of the Fighter group. Here the stage of warning ended and the stage of interception began.

Defence of Great Britain, 1940-41

At the time of the Battle of Britain, Fighter Command was organized into four groups, each divided into geographical sectors. A sector contained a headquarters and operations room of its own, together with one or more fighter airfields. At Command, at the groups, and at the sectors, the operations rooms differed in size,

but each included a large table-map showing the position and course of aircraft by means of counters moved by members of the Women's Auxiliary Air Force known as plotters. Through head telephones worn throughout their tour of duty, the girls received minute-by-minute information and transferred it to the table-map. Overlooking the table sat the officers responsible for conducting the interception and defence. At Fighter Command headquarters, in addition to the commander-in-chief, there was the commander-in-chief A.A. Defences, the Royal Observer Corps commandant, liaison officers from the Admiralty and from Bomber and Coastal Commands, and a ministry of Home Security official.

The C-in-C. exercised general control over the opening of A.A. gunfire and use of searchlights through the C-in-C., A.A. Command. He also controlled the balloon barrage and the civil air raid warning system. Group commanders decided which sector should meet any particular raid, and sector commanders detailed the fighter units. Normally, in order to prevent the shooting down of friendly aircraft, A.A. Command were allotted specified areas in which gunfire alone provided the defence, known as inner artillery zones. Other areas were detailed for fighters alone, and yet a third type of area would be the responsibility of either guns or fighters, depending on the orders in force.

When warning of the approach of enemy aircraft was received, simultaneous warning was sent out to the fighter airfields, to the gun batteries, to the balloon barrage, and to the authorities of the town or area which was thought to be the target. At the airfield the fighter aircraft took off and were directed towards the raiders by their sector operations room controllers over the radio telephone. Gun batteries opened fire at any enemy aircraft within range in the zones allotted to ground defence. Balloons were raised to the best defensive height. Sirens sounded to warn the target towns. (See Air Raid Warning.)

This was the system of defence of Great Britain in the summer of 1940. By Aug. 12, dozens of German aircraft employed to attack Channel convoys and ports had been destroyed by the Hurricanes and Spitfires of Fighter Command. On Aug. 15, 76 enemy aircraft were shot down, the record

for one day; and on Aug. 18 another 71. In the four weeks from Sept. 8 to Oct. 5, 3,291 day patrols were made by fighters.

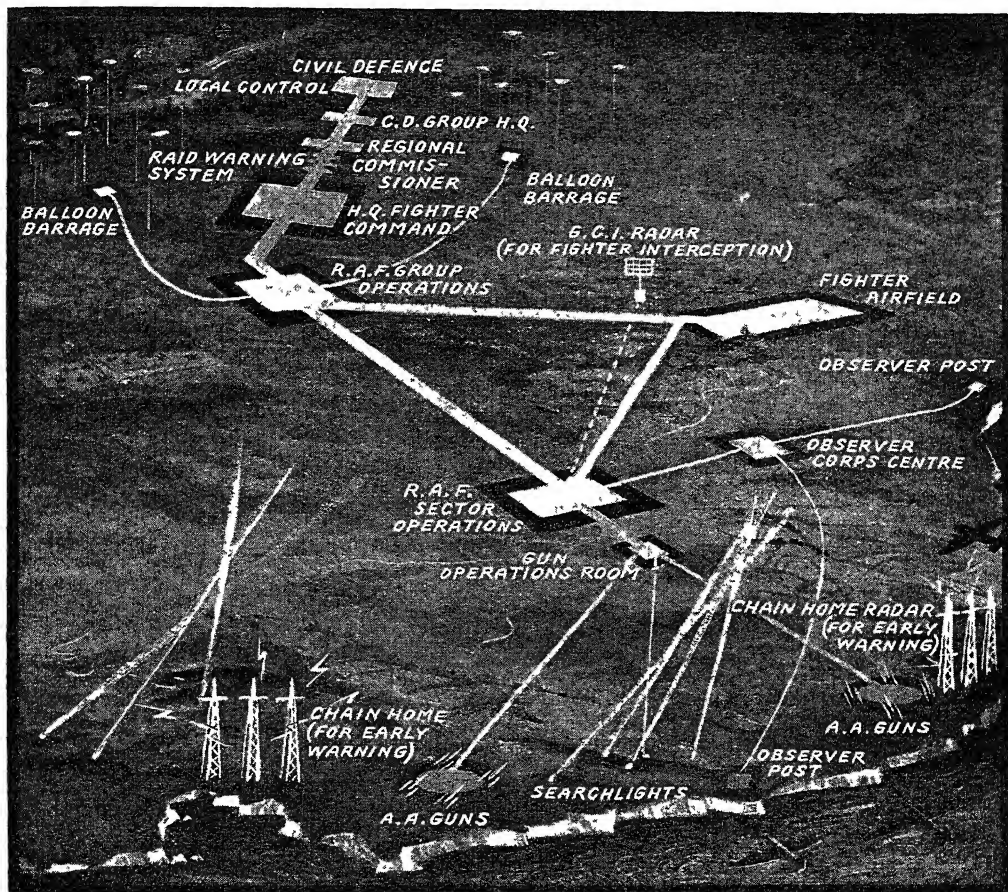
A similar system, suitably adapted, was used to intercept the night raiders during 1940-41. Sector operations rooms sent up the fighters and directed them towards the attacking force—a process known as vectoring. The big difference between day and night interception was that from early in 1941 the night fighter carried its own radar set capable of detecting hostile machines to enable the hunting machine to "home" on to its quarry.

Once within range, the night fighter was often able to pick up the enemy on his own instrument, and finally to get within visual range of the aircraft and shoot it down. The most successful night was May 10, 1941, when night fighters claimed to have shot down 29 raiders. Total claimed for the month was 111, double that for April and five times that for March. The German attack on Russia in June, 1941, signalled the end of large-scale air attack on Britain, so that the problem of whether or not the British air defence could make the night raids as prohibitive in cost as day raids was never answered.

Fighters and A.A. Guns

Throughout the war R.A.F. fighters were of three main types—the single-seater single-engine type, such as the Spitfire and the Hurricane, the two-seater single engine, such as the Defiant, and the twin engine, such as the Beau-fighter and Mosquito. Comparable American types of aircraft were used, notably the Mustang and the twin-fuselage Lightning. The Hurricanes and Spitfires were at first armed with machine-guns, but were later converted to fire cannon or guns, or both. Heavier types of fighter were used to project rocket missiles.

Generally speaking, just as radar was the first line of the warning system and the observers the second, in the interception system the fighters were the first to meet the enemy and the guns the second. Once an enemy raider had penetrated the fighter screen, he was the responsibility of Anti-Aircraft Command. This command was also divided into geographical areas, but its guns were positioned chiefly around or in large towns or important target areas. Anti-aircraft forts, largely manned by personnel of



Air Defence. Chart showing measures used in Great Britain in the Second Great War. The perfection of radar—for early warning of an approaching raid, for tracking its progress for guns and searchlights, and for intercepting its course with the aid of day or night fighter aircraft—was the greatest single factor in the success of the system, but the human element at every stage also proved equal to every demand.

the Royal Navy, were also sited round the coast.

Instruments for the laying and firing of guns were much improved between 1939 and 1944. The biggest single step was the adaptation of radar to enable guns to be ranged and directed on to an unseen target. This device mainly replaced the expensive and often ineffective box barrage or massed shell-fire—a relic of the last war—as a defence against night raiders. It also eventually superseded the searchlight as a means of searching for high-flying raiders.

Another development was the mobile anti-aircraft gun, which made swift concentration of defensive fire possible, and the anti-aircraft rocket, the cheapest and most effective form of defence against low-flying raiders.

The average heavy A.A. battery contained up to eight guns, being connected by telephone to the gun

operations room and through this to the Fighter Command operations room, itself the link with balloons and searchlights. Rocket batteries and machine-gun units were part of a much more elastic organization, centred largely on industrial targets.

Until the opening of the flying bomb attacks in June, 1944, A.A. Command was comparatively inactive in Great Britain. Many batteries were transferred overseas, and others taken over by the Home Guard. By the autumn of 1944 Home Guard gunners were manning rocket batteries and 27 heavy gun batteries. The attacks with flying bombs necessitated a sudden revival of A.A. activity. Batteries were massed on the coast in the known path of the bombs, and with practice and improvement in predictor control eventually achieved upwards of 80 p.c. success in hitting their

targets. One day in August, 68 out of 96 flying bombs were shot down, and only four reached their target, London.

Fighter Command also experienced a great revival of defensive activity. The new Tempest fighter appeared, and achieved many successes in chasing and shooting down flying bombs. The most notable development from some points of view, however, was the success achieved by counter-bombing. For a whole year the launching sites of the flying bombs in France and Holland were attacked by bombers and fighters, more than 100,000 tons of bombs being dropped. As a result it was estimated that two-thirds of the potential air effort against London was stopped at source. Counter-bombing was also the method of defence adopted against the V2 rockets, launched chiefly from bases in Holland. This counter-

bombing also brought into prominence the work of the R.A.F. photographic reconnaissance aircraft and interpreters, who first detected the well-hidden enemy launching sites.

The part played by balloons in the defence of Great Britain was unspectacular but important. They were never intended to stop bombing, but they could and did force the bombers up to heights at which—for the Germans—bombing was inaccurate and heavy A.A. fire most effective. By the time the Allied air offensive on Germany was launched, bomb sights had become so improved that height was little handicap. (See Balloon Defences.)

From 1942 onwards air defence became a matter of more urgent concern to the Germans than to the British. A radar system similar to the British—and actually copied from it—was the backbone of the warning system. Day and night fighters were employed, as well as searchlights, balloons, and anti-aircraft guns. Anti-aircraft fire, or *flak*, was relied upon by the Germans to an enormous extent, particularly from heavy-calibre rail-borne guns.

The Germans developed skilful camouflage, extensive smoke screens, and cleverly built decoys and dummy buildings to a much greater extent than did Great Britain, where lack of space prevented full employment of devices of this kind. The increasing tempo and accuracy of Allied bombing forced them in the later stages of the war to practise widespread dispersal of industry and even the construction of entire factories underground. They also produced the last word in interception—the rocket fighter. None of these forms of defence, however, availed against the weight of the British and American attack.

Air Defence of Great Britain.

An organization and command of the Royal Air Force brought into being before the Second Great War to operate, as the title implies, to protect the country against hostile attack from the air. The title was dropped, to be replaced by those of Fighter Command and Bomber Command. The complex and highly efficient system of home defence incorporating fighter groups disposed at key positions, and an elaborate system of communication by means of radio and telephone between all fighter stations, searchlight stations, the Civil Defence warning system, and headquarters was built up by



Aire. From the base of the limestone cliff at Malham Cove (above) the Yorkshire river first emerges in full flow after an underground course

Air Defence of Great Britain and Fighter Command. It reached unparalleled heights of efficiency throughout the war. Early in 1944 the command reverted to its original title, Air Defence of Great Britain, when its chief was Air Marshal Sir Roderic Maxwell Hill. On this occasion the command was extended to embrace the R.A.F.'s own anti-aircraft artillery, manned by squadrons of the R.A.F. Regiment. At least one of these squadrons was stationed on each aerodrome in the command.

For the second time, however, the Air Forces allocated to the defence of Great Britain had their title changed, in Oct., 1944. A.D.G.B. was dropped and the name of Fighter Command (*q.v.*) was revived.

Airdrie. Municipal and police burgh and market town of Lanarkshire, Scotland. It is 11 m. E. of Glasgow, on the railway and near the Monkland Canal. It lies in a coal and iron district, and its industries include iron and brass founding, engineering, cotton and silk weaving, and paper-making. The buildings include the first free library in Scotland, opened in 1856, the present building dating from 1894. Airdrie and Coatbridge jointly elect an M.P. Market day, Tues. Pop. 25,954.

Aire. River of Yorkshire, England. It rises in the Pennines, though the exact source has been disputed. It is usually accepted that the stream flows into Malham Tarn and immediately follows a subterranean course. It then reappears from beneath the semi-circular limestone cliff wall of Malham Cove, a beauty spot 1 m. N. of Malham village. It then flows first S., then S.E. to join the Ouse above Goole. In its upper course it flows through Airedale, one of the most beautiful of York-

shire dales, but its waters become increasingly polluted in passing through the industrial area of the W. Riding. W. of Skipton is the Aire Gap, an easy passage through the Pennines into Ribblesdale, a route followed by the Leeds and Liverpool canal.

Aireborough. Urban dist. of Yorks (W.R.), England, formed

1937 from the former dists. of Guiseley, Rawdon (*q.v.*), and Yeadon (*q.v.*). It is mainly a residential area for Leeds and Bradford, and includes the vill. of Hawksworth, scene of W. Riley's novel *Windridge*. Pop. 26,190.

Airedale, JAMES KITSON, 1st BARON (1835–1911). English manufacturer. Born at Leeds, Sept. 22, 1835, he greatly developed the Yorkshire iron and steel industry. He served as Liberal M.P. for Colne Valley 1892–1907, received a peerage in 1907, and died March 16, 1911. Roland (b. 1882), his younger son, became 3rd baron in 1944.

Airedale Terrier. English sporting dog bred originally in Airedale, Yorkshirc. The Airedale



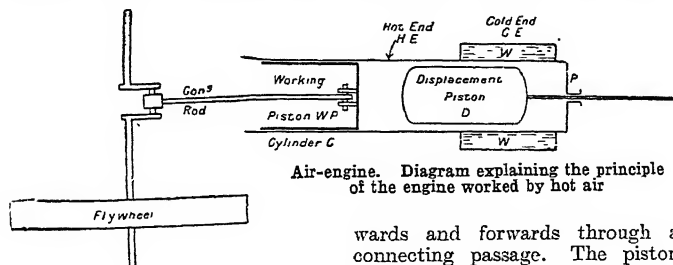
Airedale Terrier. Notable champion of a famous breed of large dog

is a large, tall terrier, weighing over 45 lb., with a rough, wiry coat, usually black and tan. He is a good retriever and a faithful watchdog companion. Airedales have been proved adept at police work.

Air Efficiency Award. A decoration instituted in 1942 for long and meritorious service in the Auxiliary Air Force and the R.A.F. Volunteer Reserve. It has a green ribbon with two central blue stripes. It was not issued until after the Second Great War ended.

Air-engine. Engine driven by hot air. It resembles the steam-engine in that the working fluid,

at the bottom and the other cooled by water. Rotation of the crank-shaft drives the air back-



Air-engine. Diagram explaining the principle of the engine worked by hot air

in this case air, is heated by the combustion of fuel not in actual contact with it. It is, therefore, an external combustion engine. It differs from other forms of heat engines in using the same bulk of working fluid over and over again.

The working principle is explained diagrammatically in the illustration. C is a long cylinder, closed at one end by a fixed plate and at the other by a working piston W P, connected by a rod with a crank-shaft and fly-wheel. The long closed piston D, mounted on a rod passing through a stuffing-box in P, is made to fit very easily, so that when it is moved to and fro air can pass freely between it and the cylinder. Part H E of the cylinder is heated by an external flame, while C E is kept cool by water circulating through a jacket W. It is obvious that, if D be moved to the right, the air will be driven to the hot end and be heated and endeavour to expand, while a contrary movement will force it to the cold end, where it will be cooled and lose its pressure. By connecting the rod of D suitably with the crank-shaft it is possible so to arrange matters that movements of W P and D are correlated. The action then is as follows: when W P is in the position shown, D is moving to the right and driving air into the hot end of the cylinder; expansion follows, and W P is driven out. By the time the working piston has completed its outward stroke, D is moving to the left, displacing air into the cold end of the cylinder and causing a fall in pressure, which allows the fly-wheel by its momentum to drive W P in again. The cycle is then repeated.

The principle described is applied differently in different types of air-engines. In one there are two separate vertical cylinders with pistons working a crank-shaft, one cylinder being heated

wards and forwards through a connecting passage. The piston in the hot cylinder is the power piston; the other returns air, when cooled, to the hot cylinder. Hot-air engines are generally inefficient, except for light work.

Aire-sur-Lys. Town of France, in the department of Pas-de-Calais. On the Lys, 12 m. by rly. S.S.E. of St. Omer, it is served by three canals and has leather, oil, nail, and flour manufactures. Its buildings include the 15th century church of S. Pierre and an 18th century town hall.

Airfield. Recognized as American term for any type of flying ground and the equivalent of the word "aerodrome" which until the Second Great War was commonly used in Britain. Aerodromes or airfields in the United States are frequently referred to as fields with a prefix, such as the Wright Field and Roosevelt Field. See Aerodrome; Airport; Airstrip.

AIR FIGHTING: ATTACK AND DEFENCE

Captain Norman Macmillan, M.C., A.F.C.

The subject is here discussed in its dual tactical aspect: (1) offensive, i.e. fighters attacking fighters or bombers; (2) defensive, i.e. bombing or reconnaissance aircraft defending against fighters. For strategy in the employment of the air weapon see Air Warfare. See also Britain, Battle of

TACTICAL OFFENSIVE. The factors governing the tactical offensive are height, speed, manoeuvrability, armament, sights, armour, and absence of blind spots. These are all dependent upon qualities in the aircraft determined in advance by the specification, design, and production experts. Other factors are personal: quality of flying training; physique; the seizing of superior height to gain the preliminary advantage of opening the attack, and determining its method; skill in taking advantage of favourable circumstances (for example, attack out of the sun to make it as difficult as possible for the enemy to see the attacking aircraft); the use of cloud cover to achieve surprise. Camouflage of aircraft may be useful in some conditions of sky and terrain. All these factors are relative between the opposing forces.

Tactical variations may be the outcome of operations over friendly territory or hostile; these may introduce the help or intervention of anti-aircraft fire and the assistance of ground control to one set of combatants, and may decide whether a descent by parachute will make the pilot a prisoner of war, a free man capable of fighting again, or a castaway in a dinghy.

FORMATIONS. R.A.F. fighter aircraft formations are built up from single aircraft into sections, flights, squadrons, and wings, with a leader for each component part,

and a deputy leader for the three larger components to assume command should the leader become a casualty. Formations usually fly in a V, diamond, or box; the aircraft in the rear are responsible for keeping a lookout behind to prevent a surprise attack from that direction. With single-seater fighters the rear aircraft must weave to right and left to enable their pilots to watch the sky behind the formation.

Communication between air crews is by radio-telephony. Code-words are used when necessary to prevent enemy aircraft or ground stations from comprehending the messages when they tune in. Individual aircraft are distinguished by a numeral, sections by colour, flights by a letter, squadrons by a number, e.g. Red 1, A Flight, 263 Squadron.

The formation leader can order his aircraft to change station in the formation, send one or more aircraft on a different course to investigate the nationality of distant aircraft, or change formation from V, box, or diamond into line, line astern, or echelon right or left, according to his judgement of the situation. Before closing with an enemy formation the wing commander can detail his squadrons how to attack, the squadron commander can similarly detail his flights, and the flight commander his sections. Methods of attack are standardised, and practised during training; they are known as attack No. 1, No. 2, No. 3, and so

on, each number corresponding to a given method or angle of approach. The exact formulae for attack orders are secret at the time of writing, but it can be stated that the numbered code denotes attacks from astern, three-quarter beam, beam, three-quarter front; port or starboard is indicated when necessary.

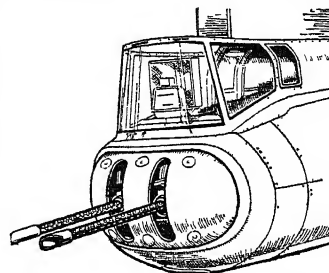
It is thus possible for the leader to detail a single pilot, a section, a flight, or a squadron to make a particular kind of attack at a given moment. When No. 263 squadron was in Norway in 1940, the commanding officer found his Gladiator fighters were slower than the German bombers. He thereupon devised an entirely new form of attack which had not been laid down in the training syllabus of the R.A.F., and used it with success.

Fighter aircraft working in pairs form the most efficient close-action team, and no matter how large a formation may be when its attack is first made, within a few seconds its fighters will find themselves

operating individually, or in subsections of two.

ARMAMENT. Fire may be opened at a range of 1,000 yards, because of the comparatively heavy armament of modern aircraft, but it is usual to close to shorter ranges. There is no standard armament in fighter aircraft, and in air-to-air fighting 37-mm., 30-mm., 20-mm., and 15-mm. cannon-guns, and .5-in., .303-in., and .3-in. machine-guns have been used in various combinations by different air forces. The cannon-gun firing an explosive shell has a slower rate of fire than the machine-gun, is heavier, and has more weighty ammunition. The .5-in. machine-gun battery produces the greatest muzzle h.p. because of its combination of rate of fire, weight of bullet, and high muzzle velocity. Comparison of muzzle h.p. enables the relative fire-power of different aircraft armament to be evaluated. The following fighter armament combinations have been used: twelve .303-in. machine-guns; four

20-mm. cannon-guns; eight .5-in. machine-guns; four 20-mm. cannon-guns and six .303-in.



Air Fighting. Tail gun emplacement in the Flying Fortress
Courtesy of "Flight"

machine-guns; four 20-mm. cannon-guns and four .5-in. machine-guns; eight .303-in. machine-guns (Battle of Britain); two 30-mm. cannon-guns.

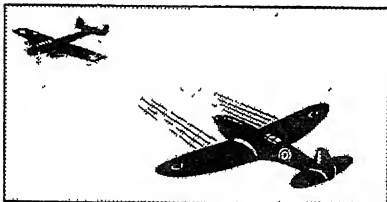
In single-seater fighters the guns are usually remote-controlled. British fighters' guns are fired pneumatically by means of a firing button on the control stick,

protected from accidental fire by some form of safety device. Each of the eight Browning guns carried by the British fighters in the Battle of Britain had 300 rounds of .303-in. ammunition and fired at the rate of 1,200 rounds a minute; bursts of from one to five seconds were fired. During the air Battle of Berlin, Luftwaffe fighters used rocket projectiles, not very successfully, against Allied aircraft. These rocket projectiles are fired electrically.

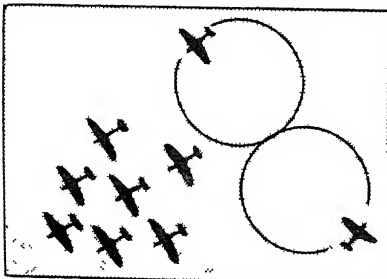
The reflector sight (first invented in France), in which the image of the sighting circle is projected on to the windscreen, was a great advance on the earlier ring-and-bead and Aldis tube sights. During the Second Great War the British reflector sight was improved by the addition of an electric computer which corrected automatically for the speed and for the



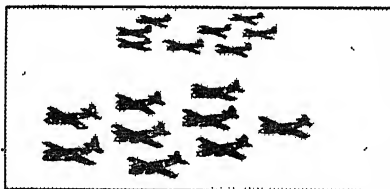
Fighter patrol above and behind, protecting rear; the arrow shows the weak spot in defence of a bomber formation



A fighter must have the nose of the plane in line with the enemy before firing a burst



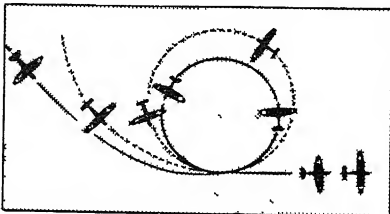
Two scouts patrolling rear of fighter squadron, usually in S-form



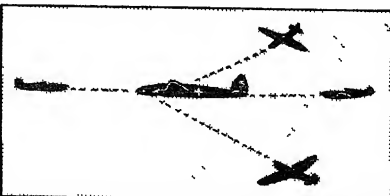
Fighter patrol above a bomber formation



Attacking on a flat course



Inside turn to bring guns to bear on the opponent



Front, rear, and beam attacks are made, depending on type of bomber

AIR FIGHTING: TACTICAL METHODS OF ATTACK AND DEFENCE

Courtesy of "ABC of the R.A.F."

relative angle of flight of enemy aircraft after the pilot had given the instrument certain basic data settings.

ENGAGEMENT. In fighter-to-fighter actions pilots endeavour to get on to the tail of the selected enemy aircraft, which, being able to fire only straight ahead, is then most vulnerable. The pilot of the aircraft thus engaged must turn to escape the fire, and manoeuvre becomes all-important. The aircraft that can turn in the smaller circle will escape its opponent's fire and eventually get on the other's tail and be able to stay there. Escape by diving is dangerous, for the attacking aircraft can also dive and fire a no-deflection shot. But cloud cover sometimes makes it possible to dive out of sight and so escape, although German pilots in Norway often hit mountains by adopting this practice. Climbing in a turn is useful, if it does not result in the aircraft's stalling and losing height. Skill in flying, exceptional marksmanship, and extreme courage are the characteristics of successful fighter pilots.

Some fighters carry a crew of two, e.g. Blenheim, Beaufighter, Defiant, Mosquito, Messerschmitt 110 and 210, Black Widow. The second member of the crew may have a rear gun or guns, or be simply a navigator. The Defiant pilot had no guns. The rear gunner operated the complete battery of four Browning .303-in. machine-guns. Luftwaffe pilots mistook it for a Hurricane or Spitfire and dived on it from above. One Defiant gunner shot down five Junkers 87s over Dunkirk. His squadron, No. 264, shot down 37 enemy aircraft in one day (May 29, 1940).

TACTICAL DEFENSIVE. Bombers are usually equipped with a number of guns, each covering a wide arc of fire. Fighter pilots endeavour to find a blind spot in the bomber's field. Bombers protect one another's blind spots by flying in suitable formation. Fighter pilots therefore try to split up bomber formations. To distract the crew of a bomber it is usual for more than one fighter simultaneously to attack one bomber.

Flying Fortress bombers, designed to operate by day in face of severe enemy opposition, carried 13 .5-in. machine-guns. Their long range, volume, and wide field of fire made Fortress air crews redoubtable opponents of German day fighters. At one period of the

war escort Fortresses were used carrying 30 .5-in. machine-guns and two 20-mm. cannon guns, but they were not fast enough and their use was discontinued. Long-range day fighters escorted the bombers. Until near the end of the European war British night bombers had only .303-in. machine-guns. Intruder fighters assisted them by engaging enemy night fighters.

NIGHT FIGHTING. Night fighter pilots are selected for excellence of night vision, and receive special



Air Force Cross and Medal, awarded for courage and devotion to duty while flying

training. Before going on patrol they wear dark glasses to accustom their eyes to darkened light. Night fighters operate as single units or, when numbers are engaged in the same area, in an open formation, usually with line astern characteristics.

Intruder night fighters operating over hostile territory usually select known airfields as their hunting ground and attack aircraft taking off or returning from missions.

The most difficult factor in night fighting is to determine the range of aircraft, and collisions are often narrowly averted. Aircraft searchlights have been tried, but expose their user to location, and consequent fire. Radar (*q.v.*) equipment provides means to intercept, range-find, and sight when ground control is not available or when ground control has placed the night fighter within measurable range but not visual distance of the enemy. Extreme fire power is vital in night fighting, for opportunities to fire are fleeting and often non-recurring. Land and ship night fighter tactics are alike.

The cooperation of searchlights, anti-aircraft fire, and ground control plays an important part in night fighter defence tactics. For night interdiction, see Air Warfare.

Air Force, ROYAL. A full account is given under Royal Air Force.

Air Force Cross and Medal.

British decorations awarded to members of the Royal Air Force and also civilians in recognition of acts of courage and devotion to duty while flying. They do not come into the same category as the Distinguished Flying Cross and Distinguished Flying Medal which are bestowed on R.A.F. officers, warrant officers, non-commissioned officers, and men for acts of gallantry when flying in active operations against the enemy. The Air Force Cross is awarded, for example, to service or civilian test pilots for courage while trying new types of aircraft or to R.A.F. instructors in recognition of meritorious work in training pupils. Civilian pilots who have established records or carried out brilliant long-distance flights have been decorated with the Air Force Cross on several occasions. Both the A.F.C. and the A.F.M. were instituted in 1918. The ribbon of the cross bears red and white diagonal lines and that of the medal is similar in colour pattern but the lines are smaller. The D.F.C. and D.F.M. ribbons have blue and white diagonal lines.

Air-gas. Gas composed of air and hydrocarbon, also called petrol air gas and gasoline-gas. When air is passed through petrol or similar light hydrocarbon it takes up a proportion of the hydrocarbon and is rendered inflammable. This is known as air-gas. It is necessary that the air should contain either under 2 p.c. or over 5 p.c. of petrol, because air saturated with between 2 p.c. and 5 p.c. of petrol is explosive.

The gas is luminous when saturated with larger amounts of petrol, but the less saturated air-gas is useful for heating gas mantles. The various kinds of apparatus are designed to give the proper mixture of hydrocarbon vapour and air and to work with as little attention as possible. The motive power may be either a falling weight, water power, or a hot-air engine. Air-gas is a substitute for acetylene as an illuminant in country districts, in the absence of coal-gas.

Airgraph. Form of postal letter sent by air mail and introduced in 1941, originally between H.M. Forces in the Middle East and Great Britain. The sender wrote the message, and name and address to which it was to be sent, on a special form which, on being submitted to the postal authorities, was photographed. A miniature

negative of it was then sent by air and, on reaching its destination, a photographic print, measuring 5 ins. by 4 ins., was made and subsequently delivered to the addressee. In Great Britain the service, after being widely used for rapid personal communication with various battlefronts and parts of the Empire, was discontinued in 1945, shortly after the end of the war when the considerable decrease in the total bulk of air mail no longer made the miniature size of the airgraph negative a necessity.

Air-gun. Weapon that is fired by means of compressed air. One variety has a lock which,

when the trigger is pulled, causes a needle to penetrate the door of a globular chamber under the barrel containing compressed air. A German type had the air chamber in the butt, and was loaded by winding the key in the butt with a crank. The air-gun commonly used for short-range sporting and target practice consists of a piston working in an air chamber controlled by a strong spring. The spring, being compressed by a lever attached to the barrel, is released by the trigger and the air in the air chamber is suddenly driven forward by the piston, propelling a bullet or pellet through the barrel.

other state's territory without landing and the right to land there for non-traffic purposes (e.g. to re-fuel). The five freedoms embraced, besides these two freedoms, the right to put down passengers, mail, and cargo taken on in the state of the aircraft's nationality, the right to take on passengers, mail, or cargo destined for that state, and the right to take on or set down passengers, mail, and cargo destined for or coming from any other state. At Chicago in 1944 Great Britain and the U.S.A. adhered to the Two Freedoms, but not the Five Freedoms, Agreement, although the U.S.A. had proposed, and continued to advocate the adoption of, the fifth right mentioned in the latter.

The nationality of an aircraft is that of the state in which it is registered, and every aircraft engaged in international aviation must bear markings showing its nationality and its registration letters. (See table under Aviation, Civil.) It must also carry certain documents, viz.: the certificates of registration and of airworthiness of the aircraft, the licences of the members of the crew, a journey log book, the licence of its radio apparatus, a list of any passengers and a manifest of any cargo it may be carrying. Annexes to the convention laid down rules in regard to the licensing of personnel, the grant of certificates of airworthiness, and various other technical requirements. They also contained Rules of the Air, the purpose of which was to prevent collisions (corresponding in this respect to the Rules of the Road at sea) and in general to ensure safety in air navigation.

Article 12 of the convention itself provided that these rules should be embodied in the various states' own regulations. "Each contracting state," it said, "undertakes to adopt measures to insure that every aircraft flying over or manoeuvring within its territory and that every aircraft carrying its nationality mark, wherever such aircraft may be, shall comply with the rules and regulations relating to the flight and manoeuvre of aircraft there in force. Each contracting state undertakes to keep its own regulations in these respects uniform, to the greatest possible extent, with those established from time to time under this convention. Over the high seas, the rules in force shall be those established under

AIR LAW: NATIONAL & INTERNATIONAL

J. M. Spaight, C.B., former Principal Asst. Sec., Air Ministry

How the growth of air lines and air transport necessitated new agreements is here explained, together with the terms of those agreements. See also Air Transport; Aviation, Civil

Aviation is essentially an international activity, and national legislation for the air must not only take that fact into account but must itself have as its foundation an international agreement or accord. National laws must be harmonised and coordinated, so far as is possible, if chaotic conditions in air travel and transport are not to arise. That need has always been recognized since the early days of flying. After the First Great War an international air navigation convention was signed at Paris by a large number of states, and it was on this convention that the law of the air for the United Kingdom and for British aircraft in general was based during the inter-war years. The convention of 1919, excellent in its day, inevitably became inadequate in some respects and was superseded by a new convention, adopted 1944 by an international conference in Chicago, which came into force Apr. 4, 1947. At the same time the provisional governing body set up in 1945 was established as the international civil aviation organization (I.C.A.O.), with h.q. at Montreal.

The purpose of legislation relating to flying is threefold: to ensure as far as possible the safety of those who go into the air, to protect persons and property on the ground from being endangered by the former persons' activities, and to safeguard the overriding interests of defence, revenue, and trade of the State itself. Like the convention of 1919, the new convention of 1944 contemplated the enactment by the participating

states of legislation designed to fulfil these purposes, and provided for the necessary conformity to an agreed standard of the national regulations that would result. It followed the earlier convention in starting from the principle of the sovereignty of the air. It provided, in Article 1, that "the contracting states recognize that every state has complete and exclusive sovereignty over the air-space above its territory." The completeness and exclusiveness of the sovereignty thus proclaimed were tempered, however, by Article 5, which provided that each contracting state would allow the civil aircraft of other contracting states not engaged in "scheduled international air services" to make flights into or across its territory or to make stops for "non-traffic purposes," that is to say, for all purposes other than the taking on or discharging of passengers, cargo, or mail.

Choice of Agreements

The scheduled international air services thus excluded from the right of free entry and passage—they are, broadly, the big air lines—were dealt with in two agreements appended to the convention, either of which a state was free to sign at its choice. One of these was called, officially, the International Air Transit Agreement, the other the International Air Transport Agreement. They were more commonly known as the Two Freedoms Agreement and the Five Freedoms Agreement respectively. The two freedoms accorded by the former agreement were the right to fly across an-

this convention. Each contracting state undertakes to insure the prosecution of all persons violating the regulations applicable."

The technical Annexes included one relating to Customs Procedures and Manifests. An aircraft going abroad or coming from abroad must take off from or land at a customs airport, and the formalities to be observed were laid down in the Annex. Under Article 24 of the convention aircraft on a flight to or across the territory of another contracting state had to be admitted temporarily free of duty, and the fuel, lubricating oil, spare parts regular equipment and aircraft stores on board were exempted from customs charges.

As in the convention of 1919, so also in that of 1944 the right of each state to declare prohibited areas for reasons of military necessity or public safety was recognized (Article 9). The same article allowed a state temporarily to restrict or prohibit flying over the whole or any part of its territory "in exceptional circumstances, or during a period of emergency, or in the interest of public safety." The restriction or prohibition was to be applied to all aircraft without distinction of nationality. Another article of great importance from the point of view of national defence—Article 89—gave the contracting states complete freedom of action in war or—and this was an addition, not to be found in the former convention—in any state of national emergency of which notification had been given to the council.

An International Council

The council referred to was to consist of 21 contracting states, elected by the assembly, the establishment of which was also provided for in the convention. The latter body, representing all the contracting states, was, so to speak, the parliament of the air, while the council was the executive organ. The business of the latter was to administer the technical Annexes, to collect and publish information relating to the advancement of air navigation, and to ensure that infractions of the convention were dealt with by the states whose aircraft might be concerned. The assembly and the council together constituted the International Civil Aviation Organization. They could be regarded as the beginnings of a world government for the air—a government that might well be merged some day, however far

ahead, in that ultimate international organization and supreme authority of which the Dumbarton Oaks plan was the first outline.

National Application

An international convention has not the force of law in Great Britain and Northern Ireland unless and until it has been embodied in this country's own legislation. It is so embodied by means of an enabling Act, supplemented by Orders in Council. That was how the convention of 1919 was applied to the United Kingdom. The new convention was subject to the same necessity. The Air Navigation Act, 1947, was followed by the Air Navigation Order, 1949, to give effect to it. This is a revised and consolidated version of an order dating back to 1923, and has in turn been supplemented by the Air Navigation (General) and Air Navigation (Radio) Regulations, which give the detail.

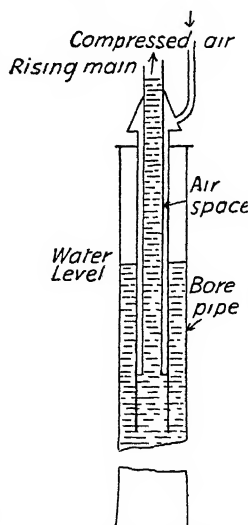
The responsibility for the administration of civil air matters rested before the First Great War with the home secretary. From 1919 until late in 1944 it rested with the secretary of state for air. A new minister—for civil aviation—was then appointed and it was he who had the duty of promoting any legislation.

Airlie, EARL OF. Scottish title borne since 1639 by the Ogilvy family. In 1491 Sir James Ogilvy was made a peer of Scotland as Lord Airlie, and in 1639 the 7th lord was made an earl. James, the 2nd earl, taken prisoner after Philiphaugh, was tried and condemned to death Jan. 16, 1646, but escaped just before his intended execution; the 3rd earl's son was attainted for assisting in the Jacobite rising of 1715, and another descendant for taking part in the rebellion of 1745. The attainders were removed in 1778. The 10th earl (1856-1900) was killed during the South African War, and his son David (b. 1893) became the 11th. The earldom is Scottish, and does not entitle its holder to a seat in the house of lords. The earl's eldest son is known as Lord Ogilvy.

Air Lift. Term used during the Second Great War for the total number of aircraft used to carry an airborne force into battle (see *Airborne Forces*, p. 189). The term was used in 1948-49, during the Russian land and water blockade of the western occupied sectors of Berlin, for the system of air transport of necessities organized by the U.S.A. and the U.K. This maintained those sectors in food, clothing, medical supplies, and some fuel for 462 days, from June 26, 1948, to Sept. 30, 1949. The total costs of the operation (excluding the value of the supplies) were over 252 million dollars to the U.S.A. and over £10,000,000 to the U.K. Well over 2 million tons of supplies were carried by aircraft of the air forces of both countries and by those of private charter companies.

The aircraft made in all, more than 277,700 flights to Berlin.

Air Lift. Form of pump for raising liquids from deep wells. Two tubes are placed concentrically inside the well bore, e.g. an outer tube 5 in. in diameter and an inner one of 3 in. bore. The outer tube is open at the bottom and extends farther down into the water or oil of the well; at the top it is sealed around the inner tube (which forms the rising main), except for a point at which a compressed-air supply pipe enters. When air under pressure is forced into the outer tube, it pushes down the water or oil, which rises up the



Air Lift. Pump for deep wells: compressed air forced between two concentric tubes causes water to rise in inner tube

inner tube. When all the liquid in the outer tube has been forced down to the level at which the inner tube terminates, air escapes up the inner tube, carrying water along with it. The compressed air mixed with this water lowers its density below that of the water in the space between the bore of the well and the wall of the outer tube; thus the denser water outside, by its greater weight, forces the lighter water-air mixture up the central tube or rising main.

The depth from which water can be raised by an air lift depends upon the depth to which the outer tube is immersed below the water level in the well or bore-hole.

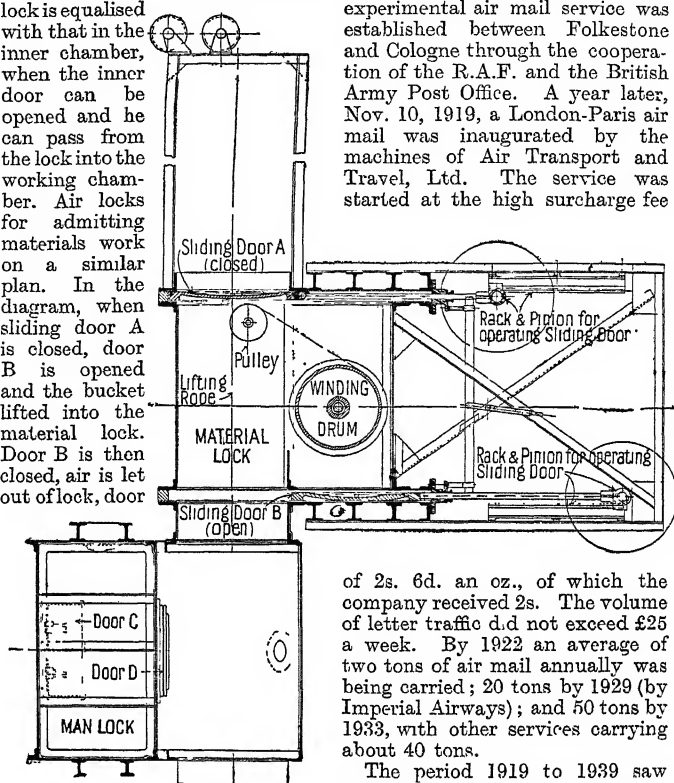
The most efficient result is obtained when the lift is three times the depth of the outer pipe in water.

Air Line. An operating company which plies for hire or reward in transporting passengers, freight, and mail by air. The first air line in Great Britain was known as Air Transport and Travel, Ltd. This concern started a daily passenger-carrying service between London (Hounslow) and Paris (Le Bourget) on Aug. 25, 1919. The aircraft was a converted D.H.4 bomber which could carry only two passengers and pilot. Later air lines were projected via Europe to the Mediterranean, the Dominions, and Colonies. Internal and feeder air lines were also introduced. In 1937 an unsurcharged Empire air mail scheme, carried out by the subsidised air line, Imperial Airways, began to operate over an England-India-Australia route. Trans-Atlantic air line services linking Britain and the U.S.A. were introduced by Imperial Airways and also by Pan-American Airways in 1937 as an experiment. During the Second Great War air lines were maintained in Scotland, to and from the Scilly Isles and Land's End, and between Liverpool, Glasgow, Belfast and the Isle of Man. British Overseas Airways, which absorbed Imperial Airways and British Airways in 1939, operated in association with the R.A.F. Transport Command and maintained its services to Stockholm, Cairo, India, South Africa, and Lisbon. This air line also introduced a weekly service to Canada and a service to West Africa. See Air Transport; Airways.

Air Lock. Airtight chamber giving admittance to a caisson or other engineering structure in which an air pressure is maintained greater than that of the outside air. Workers are able to enter or leave, and materials can be similarly moved, without loss of pressure in the workings. An air lock also serves as a compression or decompression chamber in which the pressure can be gradually varied (a) to equalise it with that in the workings; or (b) to lower it to that of the outside air. In its simplest form the air lock (see diagram) has two doors—one opening inwards from the outside air, the other opening outwards into the working chamber. To gain entrance from outside, a worker signals for the farther door to be shut; he then, by means of a valve, reduces the air pressure inside the lock until it is the same as that outside, when he enters

and closes the door. (The farther door is in the closed position.) He then admits air from the working chamber through another valve until the pressure in the

lock is equalised with that in the inner chamber, when the inner door can be opened and he can pass from the lock into the working chamber. Air locks for admitting materials work on a similar plan. In the diagram, when sliding door A is closed, door B is opened and the bucket lifted into the material lock. Door B is then closed, air is let out of lock, door



Air Lock of Sir W. Arrol. Its method of working is explained in the text

A opened, and the bucket lifted out, emptied, and returned to the working chamber through the lock by reversing the process. Door D is closed and door C opened, admitting men to the man lock. Door C is then closed; compressed air is admitted and, door D being opened, the men can descend into the working chamber below.

In order to prevent the complaint known as caisson disease, men entering or leaving workings in which high air pressure is maintained must remain in the lock while the air pressure is gradually equalised with that inside or outside, as the case may be; thus the air lock becomes a more complicated apparatus. See Caisson; Diving.

Air Mail. In 1911, to celebrate the coronation of George V, an air mail service was flown between Hendon and Windsor, the first to be established in Europe. It

bore a small mail of special picture postcards in envelopes, for the carriage of which the Post Office gave special authority. Immediately after the First Great War an experimental air mail service was established between Folkestone and Cologne through the cooperation of the R.A.F. and the British Army Post Office. A year later, Nov. 10, 1919, a London-Paris air mail was inaugurated by the machines of Air Transport and Travel, Ltd. The service was started at the high surcharge fee

of 2s. 6d. an oz., of which the company received 2s. The volume of letter traffic did not exceed £25 a week. By 1922 an average of two tons of air mail annually was being carried; 20 tons by 1929 (by Imperial Airways); and 50 tons by 1933, with other services carrying about 40 tons.

The period 1919 to 1939 saw the gradual growth of air lines all over the world. Working arrangements, compacts, and contracts were made on international lines and, once again, British Post Office organization was in the van of international understanding and internal air development.

At the outbreak of the Second Great War air mail was reaching from London to New Zealand and all the important key points on the way. In Europe the air mail system reached out to Bergen, Helsinki, Tallinn, Moscow, Bukarest, Zurich, and Athens; and the extra-European lines covered North and South America, Africa, the East Indies, and China. The annual dispatch rate of air mail had risen to nearly 3,000 tons, and 90 per cent of it was conveyed in British aircraft.

Although international air mail, in its broad peace-time sense, came to an end with the outbreak of the Second Great War, air mail development over Allied areas was intensified and brilliantly adapted to Service purposes. The

airgraph (*q.v.*) system became a vital part of the air mail services. By the end of May, 1942, ten million airgraphs had been dispatched from the U.K. to the Middle East. The total weight of film involved was under one ton. If the messages had been sent in the form of ordinary air mail letters, they would have weighed well over 100 tons. At the end of the war in Europe more than thirty million postcards had been dispatched by air to the troops overseas and total air mail items carried were twenty times as many as in the first war year.

In the United States the transport of mail by air is carried out on an extensive scale. The domestic air mail system first showed a profit in 1938. In the fiscal year of 1943 a profit of 33,000,000 dollars was realized by the U.S. Post Office Department from the domestic air mail organization.

Air Marshal. Title of the third highest-ranking officer of the Royal Air Force. It corresponds to vice-admiral in the Navy and lieutenant-general in the Army. With other titles relating to commissioned ranks in the R.A.F., which total eleven, that of air marshal came into force in Aug., 1919, sixteen months after the two air arms, the Royal Flying Corps and the Royal Naval Air Service, were merged to become the Royal Air Force. The first air marshal was Lord Trenchard. The insignia of rank are one broad and two narrow rings on the tunic sleeve or great-coat epaulette.

Air Ministry. Department of State controlling military side of British aviation. It was formed in Jan., 1918, from the Air Board shortly before the Royal Flying Corps and the Royal Naval Air Service were merged to become the Royal Air Force. Control of the R.A.F. by the Ministry is wielded by an Air Council (*q.v.*) which has its authority from the Government. The president of the Council is the secretary of state for Air; the vice-president is the parliamentary under-secretary of state for Air; with these serve the chief of air staff, the vice-chief of air staff, the air member for personnel (responsible for personal services, medical services, Women's Royal Air Force, as well as education and chaplain-in-chief's department), the air member for supply and organization, the air member for training, the permanent under-secretary of state for Air (whose department in-

cludes directorates of accounts, contracts, public relations and civil aviation, finance, the Meteorological Office, and accidents), and two additional members.

The directorate of Civil Aviation (1919-45) had appropriate departments for the administration of control of air pilots' and navigators' licences, ground engineers' licences, the licensing and registration of aircraft, and the selection of aerodrome sites. A special department was incorporated to investigate and report on air accidents in which civil aircraft are involved. The work of the medical branch, which examined, at regular intervals, commercial

air pilots to ensure their physical fitness to fly while engaged in their calling, was undertaken in 1945 by the R.A.F. central medical board. During the Second Great War the Air Ministry was greatly expanded to meet the needs arising from magnitude and extension of Britain's air power. In Oct., 1944, the first minister of Civil Aviation (*q.v.*) was appointed, with cabinet rank. The ministry itself was formed in 1945, taking over all air lines and major airports. See Aircraft Production, Ministry of; Aviation, Civil.

Air Navigation. For consideration of this subject, see under Navigation.

AIR PHOTOGRAPHY: ITS USE IN WAR

Group-Captain F. C. V. Laws, C.B.E., F.R.P.S.

This article deals mainly with the great developments in the scope and technique of air photography as practised by the R.A.F. during the Second Great War. A note is added on its application to surveying, archaeology, etc.

Air cameras were first used for military air reconnaissance in France in 1915. Wooden press cameras were used by the observer over the side of the aircraft. Later they were strengthened and lashed to the fuselage, thus becoming crude semi-automatic installations. Later special air cameras were made, and some attention was paid to their installation in the aircraft and to devices for remote control, *e.g.* automatic plate-changing mechanism. No successful roll-film camera was made at that time, chiefly because the film stock available was not suitable for the purpose.

For some years after the First Great War the P. 7, a 5 × 4 in. plate camera, was the accepted R.A.F. pattern. The use of air photography for survey and mapping caused some improvement. In 1927 a 7 × 7 in. roll-film camera, fitted with an instrument panel giving time, altitude, angle, and sequence of each exposure, was used for the air survey of Singapore. This camera was later redesigned on a unit system, the complete camera consisting of six separate units, *viz.*, the body, or central portion, to which were fitted the lens and cone, the shutter, the gearbox, the instrument panel, and the film magazine. This camera, known as the F. 8, took 100 exposures and was equipped with a range of interchangeable lenses of 7, 10, 14, and 20 ins. focal length.

The F. 8 camera was considered too elaborate for general service

in the R.A.F., and a smaller and simplified version was introduced in 1930. It proved so successful that it has since formed the basis of over 80 p.c. of all R.A.F. cameras. Known as the F. 24, it is a 5 × 5 in. film camera with a magazine capacity of 125 exposures, and has five interchangeable lenses ranging from 3½ to 20 ins. in focal length. The camera is capable of completely automatic operation by means of a remote electric control which can be pre-set for a range of different time intervals.

The production of cameras using lengths of film up to 65 ft. in length and 8½ ins. wide had no counterpart in existing photographic practice. The first films were developed on huge spirals in tanks measuring 2 ft. in diameter. Against all photographic practice, a method was tried which consisted of winding unsupported film from one spool to the other and so on while it was immersed in the processing solutions. It proved a success and still forms the standard method for the hand processing of air films.

PHOTOGRAPHIC RECONNAISSANCE. At the outbreak of war in 1939, the main purpose of air photography in the R.A.F. was reconnaissance of enemy territory. It was found that this could be successfully accomplished only by using fast high-flying fighter aircraft, which could avoid enemy interception and *flak*. The Spitfire, and later the Mosquito, were chiefly used for this purpose,

generally flying at heights of between 30,000 and 40,000 ft. Cameras fitted with lenses of very long focal length—30 to 40 ins.—took 500 exposures of $8\frac{1}{2} \times 7$ in. To increase the ground covered by each exposure, two cameras were mounted so as to obtain a slightly oblique view to port and starboard, thereby covering twice the area at each flight over the target, both cameras being operated at the same time.

It became necessary at these high altitudes to protect the camera against the extreme cold. Various forms of electrical heating were tried, such as lens heaters and muffers, but the final solution was found in the provision of a sealed and heated camera bay, with heavy plate-glass windows for the camera apertures.

Photographic reconnaissance aircraft were formed into a special unit. The first of the units—P.R.U.s, as they were called—was formed in 1940 and was mainly responsible for the gigantic task of preparing and keeping up to date an air map of the major part of Europe. The necessity for dispersal and, later, new theatres of operation, resulted in the formation of a considerable number of these units both in Great Britain and overseas.

Concurrently with the development of new cameras, an entirely new technique for the processing and printing of air negatives was worked out. As many as 2,000 negatives might be brought back from one sortie, and as many as 20 sorties a day made by one photographic reconnaissance unit. Until 1941 the work was done by hand, and employed many hundreds of ground photographers. The introduction of the continuous film processing machine, which was capable of processing, washing, and drying a continuous length of air film at the rate of 240 ft. an hour, and shortly afterwards of the multiprinter, which could expose, process, and dry prints at almost three times that speed, put the photographic reconnaissance unit level with the most modern film laboratories. Not only was there a vast increase in production per man-hour, but with a system of photo-electric negative grading, the quality of the prints could be maintained at a uniformly high level.

The most up-to-date processing and printing machinery was installed in motor-drawn vehicles. These mobile units were equipped with their own power plant and

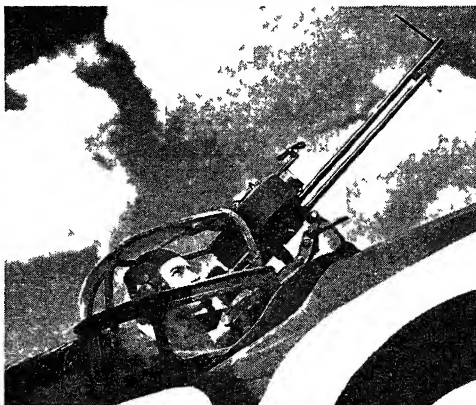
were fully air-conditioned for operation in any part of the world. They first went into operation in the N. Africa campaign, and by Sept., 1944, six complete sections, each consisting of five vehicles, were operating in France.

The importance of photographic reconnaissance in modern warfare can best be shown by giving a brief summary of its main uses.

LOCATION OF TARGETS. Photographic maps and often three-dimensional models were made of all possible target areas in enemy territory. From these it was possible to determine the exact areas for attack and to enable members of an air crew to familiarise themselves with their target and its surroundings before setting out.

BOMB DAMAGE ASSESSMENT. Air photography on the day following a raid provided the only immediate means of assessing the success of the raid. Large target areas such as Berlin were systematically destroyed by planning based on the detailed interpretation and mapping of damage after each raid. The progress of repair work could also be noticed and further attacks made at the opportune moment.

DECOYS AND CAMOUFLAGE. The systematic bombing offensive by



Air Photography. R.A.F. gunner using a camera-gun to record the result of his attack on an enemy machine

the Allies led to an elaborate use by the enemy of decoys and camouflage. Air photography proved to be the only accurate means of detecting these methods of defence. From both day and night photographs it has been possible to recognize and pinpoint all types of decoys known to be in use.

SHIPPING MOVEMENTS. Regular photography of enemy ports and

convoys provided the Allies with a comprehensive day-to-day picture of all enemy shipping. Such information was not only indispensable in the planning of air attacks, e.g. that on the Tirpitz, but considerably assisted in defensive measures for Allied shipping.

TROOP CONCENTRATIONS. The movement of troops, especially in desert areas where large distances are involved, was found almost impossible to follow without the extensive use of air photography. Even when movements were made at night, the sudden appearance of supply dumps could be used to deduce the build-up and concentration of troops in a particular area.

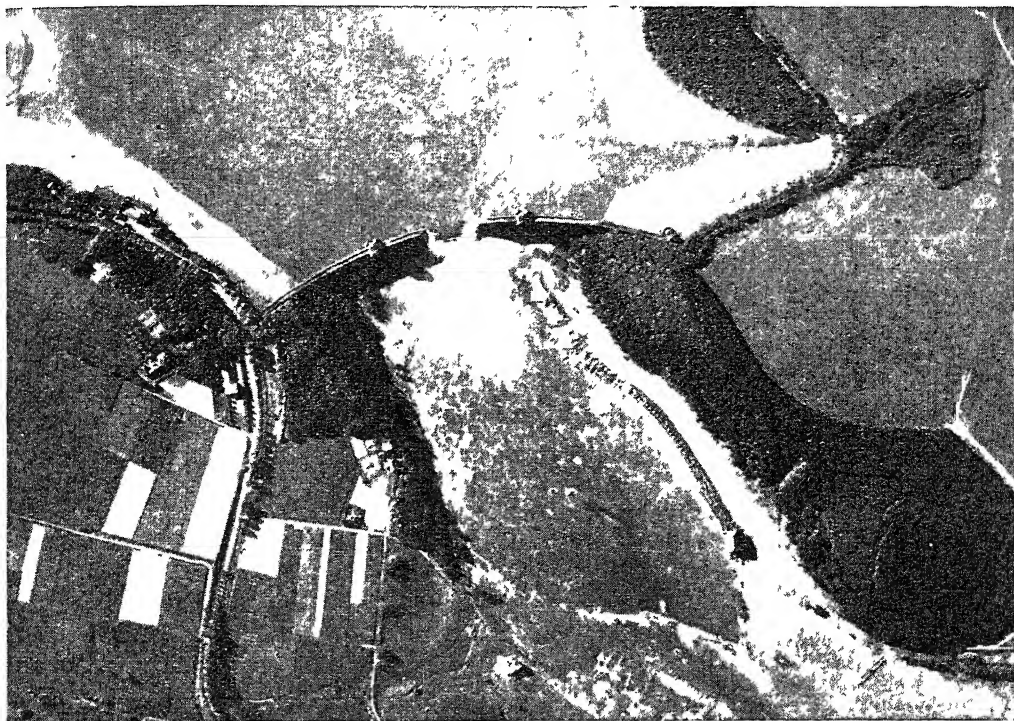
DISTRIBUTION OF INDUSTRY. An important aspect of interpretation was the study of the growth and dispersal of industry in enemy territory, and, in conjunction with ground intelligence, the estimation of the working capacity and essential requirements for raw materials. Over 80 p.c. of this information was obtained from air photographs.

TECHNICAL DEVELOPMENTS. Throughout the war, air photography was often the first and sometimes the only means of estimating the enemy's progress in technical warfare, e.g. air photographs taken from almost zero height provided the first information of the enemy's use of ground radar. Accurate plans of the construction and armament of enemy warships were also made possible.

COMMUNICATIONS. The systematic destruction of enemy railways and canals was a major objective of the Allied bombing offensive.

Air photographs made it possible to determine the most vulnerable points for attack, e.g. viaducts and bridges.

LOCATION OF V-WEAPON SITES. Following ground intelligence, a photographic reconnaissance of Peenemunde (q.v.) revealed experimental work concerned with the launching of a new type of aircraft. Similar constructions were noted in the Pas de-Calais area. A highly intensive photographic reconnaissance led to the



Air Photography. R.A.F. reconnaissance photograph taken a few hours after the bombing of the Möhne Dam, in the Ruhr, May 17, 1943. It shows clearly the 300-ft. breach through which the water surged, sweeping all before it

Photo, British Official; Crown copyright reserved

discovery of all 96 of these launching sites. As a result of subsequent bombing attacks not one of these installations was put into operation in its original form. In all, over 3,000 sorties were flown, and 1,200,000 prints were interpreted in the search for flying bomb sites. See Flying Bomb.

AIR PHOTOGRAPHY AND D-DAY. The particular application of air photography in preparation for the allied landings in Normandy in June, 1944, took the form of large-scale reconnaissance of coastal areas. Hundreds of sorties were flown, often at very low level, in order to build up detailed and exact models of all possible landing places. Defences such as coastal batteries and beach obstructions were estimated with great accuracy.

Other important military applications of air photography included night photography by use of a powerful flash—a practice which materially assisted the accuracy and effectiveness of night bombing—and cine-photography as a means of training fighter pilots and also for the recording of actual air-to-air and air-to-ground attacks. A 16 mm.

camera of specially robust construction was used for this purpose. It was mounted in the wing or turret of the aircraft so as to give an exact record of the target in relation to the pilot's aim at the time of firing.

Night photography on bombing raids was done with an open-frame F. 24 camera. The resulting pictures, although quite suitable for identifying the salient features of the target, were not sharp enough for detailed reconnaissance. To meet the need for such reconnaissance during the second battle of France, an open-frame camera with image movement compensation was evolved. An American camera, the K. 19b, which employed a photo-electrically operated shutter, was also used.

Image movement compensation, which is obtained by moving the film at the same speed and in the same direction as the optical image moves across the focal plane of the camera, was also successfully applied to day photography for obtaining needle-sharp pictures of enemy installations from fast, low-flying aircraft. Pictures of flying bomb and rocket sites obtained by this

means proved of special value in the planning of their destruction.

American equipment and technique was for the most part similar to that of Great Britain. The American camera was slightly more elaborate than its British equivalent and was built on a somewhat larger scale, the standard negative size being 9×9 in. as compared to the $8\frac{1}{2} \times 7$ in. of the British. German equipment was much larger and more elaborate. The standard German camera took a 30 cm. square picture with lenses of 25, 50, and 75 cm. in focal length. It weighed almost twice as much as the British equivalent. Consult Aero-photography and Aerial Surveying, J. W. Bagley, 1942.

The principal civilian use of air photography is in survey work and the making of maps. Soon after the end of the First Great War the devastated areas of France were remapped from vertical air photographs. In 1924 an air survey was made of the Irawadi delta, including 350 sq. m. of waterways and forests which could have been surveyed from the ground only with great difficulty. Since then air surveys have been made all over the world, especially in more

inaccessible regions, e.g. in Abyssinia, Canada, India, N. Rhodesia. A complete air survey of 120,000 sq. m. of Egypt was made in 1½ years over ground so difficult that the older method would have taken 15 years.

Both vertical and oblique photographs are made. Verticals are used for large-scale work, but when the ground is moderately flat obliques are easier to read. In the process of map-making the foreshortening is corrected by means of a grid of white lines placed over the print.

The making of air surveys has produced valuable and sometimes unexpected results in the spheres of mining, forestry, and archaeology. Important mineral deposits in the North-West Territories of Canada were discovered by this means. Air survey photographs of great areas have afforded a first intimation of the types and extent of trees and their possible value as timber. As for archaeology, in 1923 a study of R.A.F. photographs of Salisbury Plain, taken two years earlier, first revealed the line of the ancient avenue leading to Stonehenge. Since then air photography has been regularly employed by archaeologists. The Iron Age site at Woodbury, near Salisbury, was discovered by this means; in 1938 this site was acquired by the Prehistoric Society as a training-ground for archaeologists. Other archaeological dis-

coveries due to air survey include the Roman town at Caistor, near Norwich (1929), plainly discernible in air photographs beneath the fields of growing barley; prehistoric settlements and burial mounds in Wessex; the site of a wooden version of Stonehenge at Durrington, Wilts (1926); several ancient cities of Mesopotamia and Palestine; and Roman siege-works at Masada.

Air Pilot. A man or woman who has been trained in the art of flying an aircraft of the heavier-than-air type so that he or she is capable of controlling it alone, ranks as an air pilot after qualifying by passing regular tests. In the U.K. there are five forms of air pilot's licence issued to civilians. These are graded Student, Private, and (for professionals) Commercial, Senior Commercial, and Air-line Transport. Air pilots of the Royal Air Force and of Naval Aviation fall into a separate classification.

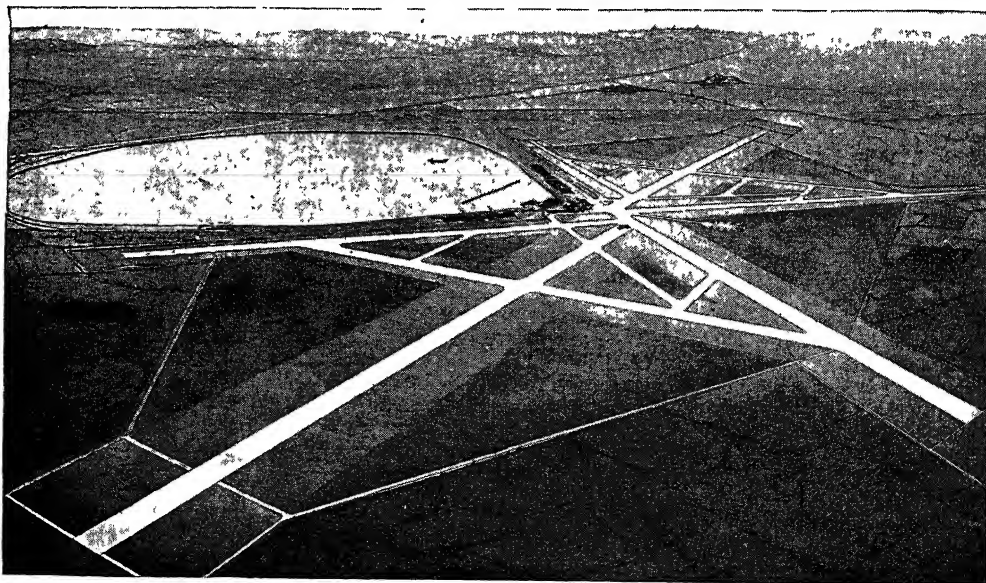
Airport. Name adopted by popular usage to indicate a commercial civil aerodrome or air station. It was not used in the original bilingual 1919 Convention Relating to International Air Navigation, wherein the term aerodrome (Fr. *aéroplane*) was used. In the Foreign Air Regulations handbooks issued by the Air Ministry from Oct., 1936, to Aug., 1939, for the guidance of air crews, Handbook No. 1, defin-

ing general procedure, used the terms air station and customs air station. In succeeding handbooks dealing with specified countries the term airport was used. But an Order in Council issued Feb. 2, 1939, again used the term aerodrome.

The terms aerodrome, air station, and airport are therefore interchangeable, with the first as the formal English statutory word, and the last the colloquial. Aerodrome, however, has the wider interpretation. Here may be noted the Transport Command term, air staging post, applied in 1944-45 to a traffic unit based on an aerodrome used for routing.

The growth of air transport, together with the development of wireless telegraphy and radio telephony, introduced flying control officers charged with the duty of directing the movement of aircraft, both in the air and on the ground. Difficult terrestrial conditions, increasing weight of aircraft, and need for weatherproofing of surface areas brought into being airports with runways surfaced by civil engineering methods instead of agricultural. The Royal Institute of British Architects formed an airports committee.

The simplest form of airport may have only one runway—the term for the taking-off and alighting strip—orientated into the prevailing wind, but major international airports such as Heathrow,



Airport. Aerial perspective view in a prize-winning design for an international airport for London. The outstanding feature is the system of one runway for take-off and one for landing. The central buildings are conveniently situated for both landplane and flying-boat operations
Courtesy of "The Aeroplane"

London, and Idlewild, New York, are increasingly elaborate.

Idlewild, 35 minutes by road from New York's centre, was built on reclaimed land, filled with silt pumped from Jamaica Bay. Half its estimated cost of £8,000,000 was chargeable to the Federal govt. Plans included a £2,000,000 administration building (containing banks, shops, restaurants, and bars) with five radial wings to serve as covered motor traffic lanes to and from the aircraft, with offices above, and overhead flat promenade roofs for the public. Thirty-five large hangars are to house main traffic aircraft, and smaller hangars feeder and private aircraft. Six runways 9 m. long, and 6 m. of taxiing lanes, laid with concrete to carry aircraft up to 130 tons weight, will handle an incoming and an outgoing aircraft every minute. Three runways 3,300, 2,700, and 2,500 yds. long were completed by 1949.

Heathrow was opened as London Airport (*q.v.*) on Mar. 25, 1946, and has, in the first instance, three runways, one 3,000 yds. and two

2,000 yds. long, and a perimeter track as a taxi-ing lane. Pending its opening, Prestwick (Ayr) and Hurn (Hants) were the main trans-ocean and intercontinental airports in Great Britain. On Nov. 1, 1945, the British government announced that all airports in Great Britain for scheduled services would be acquired by the ministry of Civil Aviation and pass into public ownership.

The salient features of an airport are runway approaches free from obstructions, with parallel runways, if used, not less than 1,000 yds. apart. The main radio transmitter must be sited well away from the airport, and aircraft monitored through it by remote control from the flying control room. Radio and radar direction finding; radio beacon approach and alighting systems; lighting systems for runways and periphery; fog dispersal installation; swift refuelling; crash and fire-fighting apparatus for runways and hangars; adequate external and internal rail and road communications—all these are essential in an airport that may cover 20 square miles.

nized in the British plan for air disarmament laid before the Air committee of the general commission of the League of Nations disarmament conference at Geneva, Feb. 21, 1933, by the marquess of Londonderry, then British secretary of state for Air. He said: "The United Kingdom government are prepared to subscribe to the universal acceptance of the abolition of naval and military aircraft and of air bombing, except for police purposes, provided only there can be devised an effective scheme for the international control of civil aviation which will prevent all possibility of the misuse of civil aircraft for military purposes."

But by then the German Third Reich had been created, and the air rearmament of Germany had begun. On March 25-26, 1935, Sir John Simon, British foreign secretary, and Mr. Anthony Eden visited Hitler in Berlin, and were told by him that the German air force was approximately equal in strength to that of Britain. From that time the stability of Europe was destroyed, and Hitler, brandishing the political threat of air power to hold off the Western democracies, successively incorporated within the Third Reich the remilitarised Rhineland, Austria, Bohemia, Moravia, and Memel, and in his penultimate attempt to seize part of Poland brought the world to war.

In 1936 the Italian army, having failed to defeat the Abyssinian tribal armies after four months of fighting, delegated to the Regia Aeronautica the task of making the first aerial gas attack in history. The Abyssinians, with no air force, and totally defenceless against mustard gas and bombs dropped from the air, were overwhelmed, except for bands that held out in the wilder parts of the country throughout the whole Italian occupation. The R.A.F. at that time was in no condition to challenge the Regia Aeronautica, and Britain's political influence had been seldom, if ever, lower.

A British civil aeroplane carried General Franco from the Canary Islands to Spanish Morocco, where his arrival precipitated the Spanish civil war of 1936-1939. In that war between the Spanish falangists and the Spanish socialists three great powers lent the aid of their air power, and German and Italian airmen and aircraft on the former side fought Russian airmen and aircraft on the other. Germany and Italy were in a more favourable

AIR POWER: ITS PLACE IN POLITICS

Captain Norman Macmillan, M.C., A.F.C.

The significant emergence of air power as a new force in international history is here examined in the light of its story before and during the Second Great War. For details of the organization and administration of air power see Air Warfare; Royal Air Force

Before the 20th century the balancing factors that swayed the issue of major diplomatic negotiations in international affairs were, in continental states, armies, and in island states, navies. But with the development of air forces into a powerful arm possessing qualities of mobility far exceeding those of armies and navies, a third and compelling influence was introduced into the arena of international relationships. The political emergence of air power occurred during the period between the First and Second Great Wars, when the term came to be regarded, *qua* power, as one signifying the international pressure which could be applied by the government of a nation in outward manifestation of its relative air strength.

The First Great War had scarcely ended when British air power was applied to maintain law and order in Somaliland, where the activities of the Mad Mullah were speedily quelled by the primary rôle played by the R.A.F. in the secret "Z" expedition of 1919. In 1922 the R.A.F. became the

controlling Service in the mandated territory of Iraq; from a few air stations at Bagdad, Basra, and Mosul it upheld the stability of government over a wide area at a fraction of the cost which control by land forces would have entailed. Air transport, later to have such overwhelming importance, was then only beginning, and the trans-desert air route was established as a military link between Cairo and Bagdad. So it came about that it was in the Middle East, and by the R.A.F., that troop-transport aircraft were evolved, and the ground forces of an army first came under the command of an Air C-in-C.

In two areas previously extremely difficult to control—the North-West Frontier of India, under the Army C-in-C., and in Aden as a Command—the R.A.F. provided an economic means to maintain stability through the superiority of its aircraft over the characteristic mobile raiding propensities of frontier and desert tribesmen.

The importance of air power for police purposes was thus recog-

geographical position, and their greater combined air strength compared with that of Soviet Russia helped the Falangists to victory.

Although air power is normally a term having international significance, more than once the internal affairs of nations have been affected by it. In the British strikes of 1921 and 1926 the R.A.F. was placed on stand-by mobilisation, and operated special communication aircraft. In the Chilean revolution of 1932 the air force took one side and the navy the other, and the navy was attacked from the air. The American Army Air Force carried the internal air mail during a cessation of the civil air mail services. The South African Air Force was used to quell a rising on the Rand.

Italians made the first belligerent use of an aeroplane in 1912 during the war against the Turks in Libya. But it was not until the First Great War that military air power was really developed. During that war Great Britain carried it to its greatest development. Thus a comparison of the growth of British air strength in the two Great Wars provides the best illustration of the development of air power up to 1945.

The First Great War

On Aug. 5, 1914, the British air service contained a naval wing, known as the R.N.A.S., a military wing, known as the R.F.C., and a central flying school. The R.N.A.S., controlled by the Admiralty, had one airship squadron (not long before taken over from the R.F.C.) and three landplane and seaplane squadrons containing 93 aircraft. The R.F.C., controlled by the War Office, had four landplane squadrons containing 179 aircraft. The combined personnel totalled 197 officers and 1,647 other ranks. On Aug. 13 four R.F.C. squadrons with 56 aircraft (all unarmed), accompanied by an aircraft park, proceeded to France. By Nov. 30 there were six squadrons in France, organized in two wings of three squadrons. In Jan., 1916, the first R.F.C. brigade was formed. At the conclusion of the armistice, Nov. 11, 1918, the R.A.F. with the B.E.F. contained 6 brigades, 17 wings, 84 squadrons, 5 special-duty flights, and 26 miscellaneous units.

During 1914-15 the R.N.A.S. made raids on targets at Cologne, Cuxhaven, Düsseldorf, and Friedrichshafen, but these efforts could

be only sporadic. In Oct., 1917, the 8th brigade, R.F.C., containing 3 squadrons, was formed at Nancy to attack the German chemical and iron industries; on June 8, 1918, this force became the Independent Force, R.A.F., with a total accumulated strength of 5 day-bombing and 4 night-bombing squadrons, and one fighter squadron. This force dropped a total of 540 tons of bombs.

The Air Ministry was formed in Jan., 1918, and the R.A.F. on April 1, 1918. In July, 1918, the Air Staff sought approval for 340 active service squadrons of an average of 20 aircraft each, but the War Cabinet warned the Air Ministry that the supply of men to maintain this strength and produce pupils for training as pilots might not be forthcoming. A total programme for 328 squadrons was agreed, and it was then anticipated that the war would continue into 1919. The actual figure attained by Oct. 31, 1918, was 200 service squadrons. The R.A.F. then had 27,906 officers, 263,842 other ranks, 22,171 aircraft, and 37,702 engines.

The British aircraft industry reached a peak employment of 350,000, and from Jan., 1918, to Oct., 1918, inclusive, produced 26,685 airframes and 29,561 engines. Excluding manufacture for the R.N.A.S. prior to March, 1917, for which no records exist, the British aircraft industry produced throughout the First Great War 47,873 airframes and 52,398 engines.

The operations of this large air force backed by a powerful industry were mainly concentrated on the Western front, where 6,904 enemy aircraft and 258 balloons were brought down or driven down, and 2,484 British aircraft were accounted missing between July, 1916, and Nov. 11, 1918. On that front 6,402 tons of bombs were dropped. On all fronts 7,908 enemy aircraft were accounted for, 2,810 British aircraft were lost, and 7,945 tons of bombs were dropped.

The Second Great War

The numerical first-line strength of the R.A.F. at the outbreak of war on Sept. 3, 1939, was about one-half that possessed when the armistice entered into force in 1918. But in the intervening years aircraft had developed, as the following examples will show. The S.E. 5A fighter of the First Great War weighed 1,953 lb. gross

and had a maximum speed of 132 m.p.h. at 6,500 ft. with an engine developing 210 h.p. Its service ceiling was 20,000 ft. The Hurricane fighter at the beginning of the Second Great War weighed 6,600 lb. gross and had a speed of 335 m.p.h. at 18,500 ft. with an engine developing 1,030 h.p. Its service ceiling was 35,000 ft. The S.E. 5A fighter's two machine-guns had been quadrupled. By the end of the Second Great War in Europe the Spitfire XIV fighter was flying at 450 m.p.h. at 40,000 ft., the Hornet, the fastest aircrew fighter, had a top speed of over 470 m.p.h., and the Vampire gas turbine fighter over 500 m.p.h.

Bombers and Bombs

The development of the bomber was no less remarkable. In the First Great War the most extensively used heavy night bomber was the Handley Page 0/400, fitted with two 275 h.p. engines. Its speed was 79 m.p.h. at 6,500 ft. when carrying 16 exposed 112-lb. bombs. Its gross weight was 12,230 lb., service ceiling 7,000 ft., and duration 8 hours. At the beginning of the Second Great War the Whitley heavy night bomber with two 1,030 h.p. engines weighed 25,900 lb. gross, and had a maximum speed of 245 m.p.h. at 16,250 ft., and a service ceiling of 25,000 ft. It carried a load of about two tons of bombs stowed internally, and could fly from 1,250 to 1,800 miles according to the disposition of fuel and bomb loads. By 1945 the Lancaster bomber carried a maximum bomb load of 22,000 lb., weighed gross almost 70,000 lb., and had a maximum speed of 275 m.p.h. and a maximum flight range of about 3,000 miles.

Bombs increased in weight from the 112 and 230 lb. heavy bombs of the First Great War to the 4,000, 8,000, 12,000 and 22,000 lb. bombs of the Second Great War. Explosives of newer and more powerful kinds were developed, culminating in the atomic bomb (*q.v.*). Incendiary bombs became potent destroyers of cities instead of feeble and unreliable nuisance weapons.

During the Second Great War, R.A.F. Commands operating in Europe, the Mediterranean, and the Middle East dropped a total of 1,219,909 tons of bombs and mines, and lost 22,120 aircraft, including those so badly damaged on return to base that they were of no further use. Included are 33,865 tons of mines laid at sea or

in shipping lanes which cost the enemy over 550 ships sunk and more than 480 damaged. Bomber Command dropped 657,674 tons of bombs on German territory.

By the end of April, 1945, R.A.F. major air attacks, ranging from 500 to 5,000 tons bomb-weight, had been made on the following German urban military targets: Berlin 22, Cologne 18.

The power of Bomber Command, the modern independent air force of the R.A.F., was referred to by Air Chief Marshal Sir Arthur Harris in his order of the day to the Command at the conclusion of the Second Great War in Europe. He said: "Nearly 100 of Germany's cities and towns, including almost all of leading war industrial importance, lie in utter ruin, together with the greater part of the war industry which they supported. Railways, canals, and every form of transport fell first to decay and then to chaos under your assaults. You so shattered the enemy's oil plants as to deprive him of all but the final trickle of fuel. His aircraft became earth-bound. His road transport ceased to roll. Armoured fighting vehicles lay helpless outside the battle, or fell immobilised into our hands. His strategic and tactical plans failed through inability to move."

In that great bombing war the United States 8th (and to a lesser extent the 15th) Air Force played a parallel and vital part.

The dominating influence of air power was not achieved without loss. Fatal casualties in Bomber Command were not fewer than the numbers killed in Britain's national invasion armies. The U.S.A. 8th A.F. lost 40,000 men killed, missing, and prisoners of war in two years of operation.

Bomber Command's early failures in attack were overcome after intensified scientific research and the production of new instruments and methods. It became possible to bomb ever closer to the ground forces in their support. On the Normandy beaches, at the hinge of the battle of Caen, the Falaise gap, the defended Channel ports, St. Vith, Houffalize, and the crossing of the Rhine, bombs broke down the obstacles that barred the passage of the surface troops and reduced their casualties to a fraction of what they might have been.

During the Second Great War it was universally conceded that no military force could deploy and operate freely by land or sea

or under the sea without having first contained the air strength of the enemy. Italy, Germany, and Japan were all defeated only after their air power was overwhelmed.

The flying bomb, rocket bomb, rocket-gun, and atomic bomb have all added their quota to the power of three-dimensional war. The shattering development of air bombardment, and the ability to place large armies into otherwise unattainable fields of action and to maintain and support them there, increase the relative dominance of great nations over those whose man-power and national income do not suffice to produce such defence on a sufficient scale.

Air-pump. Pump used for exhausting or compressing air. The commonest form of air-pump is the ordinary inflater used to compress air into a pneumatic tire of a cycle or a motor-car. The essential features are a piston or plunger and a tube or cylinder in which it works. When the piston is drawn out to its limit the tube fills with air, and when the piston is pushed home the air is driven through the hole at the bottom of the tube, and a check valve, either on the tire or in the pump itself, prevents the return of the air when the piston is drawn back again. An air-pump for exhausting air is similar in principle, but the valves are reversed and thus the action is reversed. Complete exhaustion is, of course, impossible with an air-pump. A fairly complete vacuum is created by a mercury pump such as is used to exhaust the air in electric light bulbs. Engineers' air-pumps include compressors, which increase the air pressure on the high-pressure side of the pump, storing it for use in compressed air tools and apparatus, and blowers which are either rotary or centrifugal.

Air Raid Precautions (A.R.P.). An Air Raid Precautions dept. of the Home Office was formed April 1, 1935, the responsibility for civil defence in Great Britain being then taken over from the committee of Imperial Defence. The first official circular dealing with A.R.P. and drafting a general scheme was issued in July, 1935. In Dec., 1937, an Air Raid Precautions Act was passed, requiring local authorities in Great Britain to organize schemes of general precautions so that in the event of hostilities preparations could be well advanced to meet heavy air attacks against the civil population. Shortly

afterwards a booklet on National Service, explaining and classifying the various ways in which the public could volunteer to serve, was issued by the government to every household in Great Britain. Volunteers for A.R.P. came forward in large



A.R.P. badge of white metal, as worn by A.R.P. personnel 1938-41

numbers, and more than 5,000 local A.R.P. training schools were soon established. The first big A.R.P. exercise was held in 1937 at Southampton and Portsmouth. The first official A.R.P.

handbook, *Personal Protection Against Gas*, was widely circulated, and later a government booklet on A.R.P. in the home was distributed free. The public gradually became familiarised with the general principles of A.R.P. throughout the months immediately before the outbreak of war, and warden in particular made it their business to establish public confidence in the system. The white metal A.R.P. badge, worn on the lapel of civilian clothes, became an accustomed sight.

Air raid precautions in Berlin before the war were in advance of those existing in London, though Great Britain was ahead of any other country in the matter of gas-masks. France lagged behind Great Britain. Paris air raid shelters were few in number, and preparations in the French capital and the provinces developed only slowly.

On Sept. 1, 1939, the day Germany invaded Poland, a reserve of some 700,000 part-time A.R.P. workers was created in Britain to supplement those already enrolled. The voluntary workers far outnumbered the paid ones. Full A.R.P. machinery was put in operation from that date, including a complete black-out.

From Sept. 3, 1941, local A.R.P. services were re-named in groups, viz. Civil Defence Wardens' Service (C.D.W.S.), Civil Defence Ambulance Service (C.D.A.S.), etc., the letters C.D. being substituted for A.R.P. on uniforms of all civil defence forces.

From its inception the responsibility for A.R.P. in Great Britain devolved upon the Home Office, later the Ministry of Home Security. See Civil Defence.

AIR RAIDS: GREAT BRITAIN AND GERMANY

Captain NORMAN MACMILLAN, M.C., A.F.C.

This article gives the full story of the attacks on Great Britain by aircraft of the German Air Force and of the R.A.F. attacks on Germany and German-occupied territory. It deals with raids by piloted aircraft only. Details of attacks by Flying Bomb and Rocket Bomb are under those headings. For information about other air raids see under Japan; Malta; Spanish Civil War; and under such headings as Hiroshima, Pearl Harbour, Rotterdam, Tokyo, Warsaw, etc. See also Air Warfare; Bomb, etc.

1. ON GREAT BRITAIN

In the First Great War, 108 bombing raids on Great Britain were made by German aircraft, 51 by Zeppelin airships, 57 by aeroplanes. A total of 8,776 bombs was dropped, the first during an aeroplane raid over Dover, Dec. 24, 1914. Up to almost the end of 1916 the activity of aeroplanes was mainly confined to the S.E. coast area, and certainly did not extend as far as London. Their attacks were not greatly effective.

At the outset the Zeppelins presented a more serious problem for the defences. The first airship raid was made on the night of Jan. 19-20, 1915, over Yarmouth and Cromer, one ship over each town. Casualties were 4 killed, 16 injured. The killed were the first people in Great Britain to die by enemy action from the air. Further Zeppelin raids followed over coastal areas, even as far N. as Northumberland, and continued on moonlit nights throughout 1915 and 1916. The first enemy bombs to fall in the London area were dropped from a single Zeppelin on the night May 31-June 1, 1915. Damage amounting to £500,000 was caused in one London raid, Sept. 8, 1915.

Failure of Zeppelins

Gradually the defences against airship attack were strengthened, particularly in the London area (see Air Defence). After Oct., 1916, when several airships had been brought down either over Great Britain or on the homeward journey, the attack died down. A year later, Oct. 19-20, 1917, an attempted raid by 11 airships over the Midlands and London ended in complete failure, mainly owing to weather conditions. Because the defences did not need to go into action, being indeed deliberately withheld, this was long remembered as the "silent" raid.

The Germans then turned to the aeroplane again, introducing an improved bombing machine, the Gotha, with a larger Gotha added in 1918. The first aeroplane raid on London was made by a single machine on Nov. 28, 1916. The worst, from the point of view of casualties, was the daylight raid of June 13, 1917, when 22 raiders dropped nearly 100 bombs in the

Liverpool Street area, 162 people being killed and 432 injured. In a further damaging Gotha raid on July 7, 76 bombs were dropped over the city of London, causing heavy destruction as well as the death of 46 people and injury to 123. After this the defences were so quickly reorganized that the Germans switched to night raids. From Sept. 3, 1917, Gotha attacks by moonlight were the main feature of their attack, continuing somewhat spasmodically and with varying results until defence had once again caught up with attack. In 1917, 21 Gothas were shot down. The last raid on London, which was the last serious raid of the war, was on May 19-20, 1918, and was one of the heavier ones. Between 30 and 40 machines took part, and casualties were 49 killed, 177 injured.

Total British air-raid casualties in the First Great War: 1,413 killed, 3,407 injured (London area: 587 killed, 1,627 injured).

The Second Great War

The German air raids on Great Britain in the Second Great War were all strategic in conception; at no time did they become tactical in the sense which implies cooperative effort with surface forces. The Luftwaffe therefore had to operate over Britain with the advantage of ground control in favour of the defence. (See Anti-Aircraft Command; Balloon Defences; Fighter Command.)

The Italians made only a faint contribution to the German air attack on Great Britain. R.A.F. pilots believed that Italian aircraft occasionally formed part of the formations that flew over England during the daylight assaults of 1940, but none was brought down. The Regia Aeronautica's most notable ventures were two raids against shipping off the Thames estuary on Nov. 11 and 23, 1940, by Fiat C.R.42 fighters and Caproni 135 bombers; both ended in failure and rout, with the loss of 12 fighters and 8 bombers, and Italian raids against Great Britain ceased.

German air activity against Great Britain in the early days of the war mainly took the form of armed reconnaissance. In the evening of March 16, 1940, 14 Junkers 88 bombers attacked the

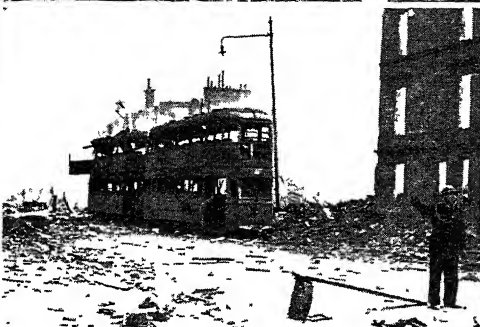
fleet anchorage at Scapa Flow; many of their bombs fell on land, and the first British civilian to die by enemy air action in the Second Great War was killed that evening at Bridge of Waith, Orkney.

The first German bombs to fall on the mainland of Britain exploded near Canterbury on May 9, 1940. German air attacks against industry in Great Britain began with a raid on Middlesbrough on May 24, 1940. But the first large-scale attack came in the night of June 18-19, 1940, when about 100 enemy aircraft crossed the coast between Kent and Yorkshire. Attacks on the same or a smaller scale continued until July 1, 1940, when the first daylight attacks were made, against Hull and Wick. The attacks thereafter increased in scale, until on July 9 this preliminary probing of Great Britain's air defences changed to the real attack.

Battle of London

Throughout the German air attacks of 1940-41 the strategic attacks against industry and communications were interwoven with planned attempts to smash down Great Britain's air defences. The first were mainly night attacks, the second mainly day assaults. (For the day assaults see Britain, Battle of.) The first great daylight raid against a British city was that on the afternoon of Sept. 7, 1940, which inaugurated the battle of London. The fires in the docks area were a beacon which brought the night bombers as surely as moths to a candle. Some of the day force of 350 bombers and fighters attacked aerodromes while the main body concentrated on London. The night force of 250 bombers attacked in a chain formation from 8.10 p.m. to 4.30 a.m. Air forces had not then learnt how to deal concentrated blows in darkness.

London was the first main target for the nightly blows of the Luftwaffe. From Sept. 7 until Nov. 2 there was an attack each night upon the capital. On one night only was the attack (for those days) light, when on Oct. 6-7 only one bomb fell. September was London's crisis month; 5,730 people were killed and almost 10,000 seriously injured in London and its environs. In the attempt



1. Manchester, looking along Deansgate to the Cathedral; on the extreme right is the tower of the burnt-out Exchange. 2. Clydeside scene: tramcars, windows shattered, stand amid the debris from overnight bombing 3. After the terror raid on Coventry, Nov. 14, 1940. 4. All that remained of Canterbury

Cathedral library after a Baedeker raid. 5. Ruins of the school in the Sussex village of Petworth. 6. Partly cleared bombed area in Liverpool: the photograph shows the destruction wrought near the Victoria Memorial at the bottom of Lord Street. Views of London damage accompany the article on London

AIR RAIDS: TRAIL OF DEVASTATION FROM PROVINCIAL CITY TO COUNTRY VILLAGE

to make this the month of defeat for Great Britain, the Luftwaffe also hurled day bombers against the capital in a round-the-clock offensive. The Battle of Britain began at the end of that month to peter out to its own ragged end, but the fierce night attacks continued to fall upon London, and soon afterwards upon the larger provincial cities.

The great London raids of 1940 were on the nights of Oct. 15, Nov. 15, Dec. 8, and Dec. 29. The fire of London which raged all round St. Paul's occurred on the last of the four nights; over 100 bombers dropped incendiaries before midnight, and the enemy planned to follow with 400 tons of high explosive bombs after midnight, but fog closed down on the Continental aerodromes and spoiled his plan. Then followed the heavy raids of Jan. 11 and 12, Feb. 17, March 19, April 16 and 19, and May 10, 1941. The last of these brought the greatest weight of bombs to fall on London in one night—450 tons.

Provincial Cities

In some ways the most remarkable of the provincial raids was the attack on Coventry on Nov. 14, 1940, by about 400 bombers in full moonlight over a period of about 11 hours; 1,200 H.E., approximately 30,000 incendiary bombs, and 50 parachute mines were dropped. Bragging of it afterwards, Goebbels coined the word "to Coventrate."

Ports and industrial centres were the main targets for the night attacks—Southampton, Avonmouth, Liverpool, Birkenhead, Cardiff, Portsmouth, Plymouth, Swansea, Clydebank, Hull, Belfast, Birmingham, Coventry, Bristol, Sheffield, Manchester. Much damage was done, and many citizens were killed or injured, but the attack failed, not because its strategic conception was at fault, but because its technique was inadequate. The Luftwaffe had been built up to work with the army, not to wage independent strategic war, and by itself it could not cause sufficient damage to inflict a mortal blow to urban areas as large as those of Great Britain. Its bombers were really day bombers designed for speed, with fuselages too slim to carry enough bombs; they landed fast, and many crashed on their own aerodromes, being piloted by air-men insufficiently trained for night flying. The German air staff had not learned the art of mass assault in darkness; seldom could they

saturate the civil defence, and then only when water supply broke down, as in the London raid of Dec. 29, 1940, or with the shortage of fire appliances in Manchester on Dec. 23. Given equipment and courage, the fires were not uncontrollable. The German military leaders had overestimated the power of the individual bomber and underestimated the weight of bombs required to destroy a built-up area.

When on June 22, 1941, they invaded Russia, they acknowledged their first military failure. The Russian adventure absorbed most of the bombers of the Luftwaffe, and the scale of air attack against the United Kingdom never again reached its first proportions.

Apart from its main targets the Luftwaffe bombed coastal towns, small country towns, villages, and even farms. The following list of places gives some indication of the widespread nature of these attacks: Aberdeen, Bexhill, Bourne-mouth, Bridlington, Brighton, Clacton, Deal, Dover, Eastbourne, Falmouth, Folkestone, Fraserburgh, Great Yarmouth, Grimsby, Hastings, Hove, Jarrow, Lowestoft, Margate, Newcastle, Peterhead, Ramsgate, St. Ives, Scarborough, South Shields, Truro, Tynemouth, Walsall, Weymouth, Worthing; the list could be extended to include even fishing villages.

Baedeker Raids

In 1942 the strength of the Luftwaffe declined, while that of the R.A.F. rose. But the German air staff was stung into making some attempt at retaliation by the growing weight of R.A.F. attacks which followed the first concentrated area bombing of Lübeck on the night of March 28 and of Rostock on the nights of April 23, 24, 25, and 26, 1942. In what were called Baedeker raids (from the name of the publisher of German guide books) the Luftwaffe began a series of attacks against the cathedral cities of England. Exeter, Bath, Norwich, York, and Canterbury were the towns singled out for reprisals. These were sheer terror raids with no military significance. The forces employed were small—from 20 to 50 bombers in each attack—but were large enough to cause serious damage in such small cities, relatively unprotected against air attack. Over Exeter, for example, there flew no balloon barrage, and the bombers were able to fly low above the buildings in the neighbourhood of the cath-

dral and unload their cargoes of incendiaries with great accuracy, and almost totally to destroy the picturesque High Street. Yet in the majority of these attacks the Luftwaffe lost 10 per cent of the aircraft employed, and after a seven nights' run beginning on April 24, there were but two more, on May 3 and May 31.

There were only four important air attacks against the United Kingdom during the remainder of the year. Birmingham was attacked on the nights of July 27, 29, and 30; 26 bombers were brought down in the three raids, so rapidly was night-fighter interception improving. On October 31 a snap raid directed in the afternoon against Canterbury cost the enemy nine bombers for the loss of two R.A.F. fighters.

"Tip and Run"

1943 was notable for the still greater diminution of enemy air attacks on the U.K., despite the growing Allied air attacks on Germany. Shortage of aircraft forced the Luftwaffe to make attacks with small forces, and to avoid deep penetration beyond the coastal belt. Most of the raids were made by fighter-bombers, carrying one or two 500-lb. bombs or one 1,000-lb. bomb. The early part of the year saw a considerable number of these "tip-and-run" raids against the English coastal towns nearest to Continental airfields. But when Fighter Command Spitfires and Typhoons destroyed more than 60 of these enemy aircraft in three months, the Luftwaffe reduced this unprofitable activity. On Jan. 20 Typhoons shot down five of 15 raiders. More than 1,000 guns were deployed along the south coast. Often the German aircraft were over their target for only seven or eight seconds. Yet the gunners shot down 60 per cent of these raiders at Torquay and the figure rose to 65 per cent at Eastbourne.

German night attacks against Great Britain during 1943 were also made chiefly by fighter-bombers. They were on a small scale and were countered by improved night defences. Only one-third of the bomb tonnage that crossed the coast during the 1943 air attacks on Great Britain, aimed chiefly at London, was dropped in the Greater London area; the German pilots dumped their load outside rather than face the London barrage.

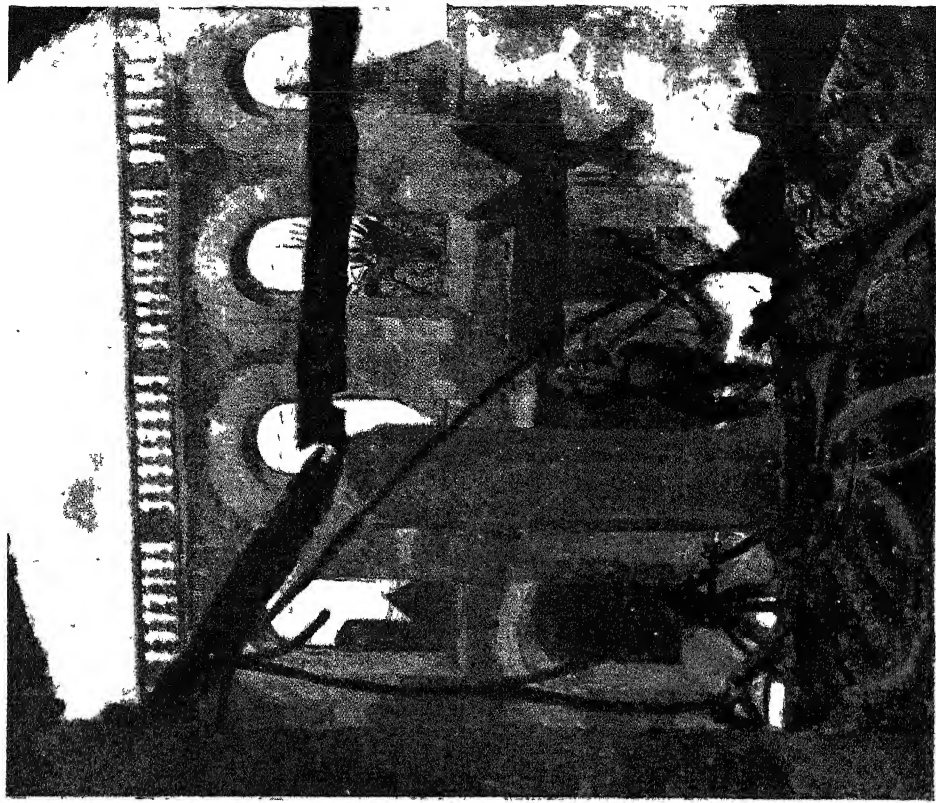
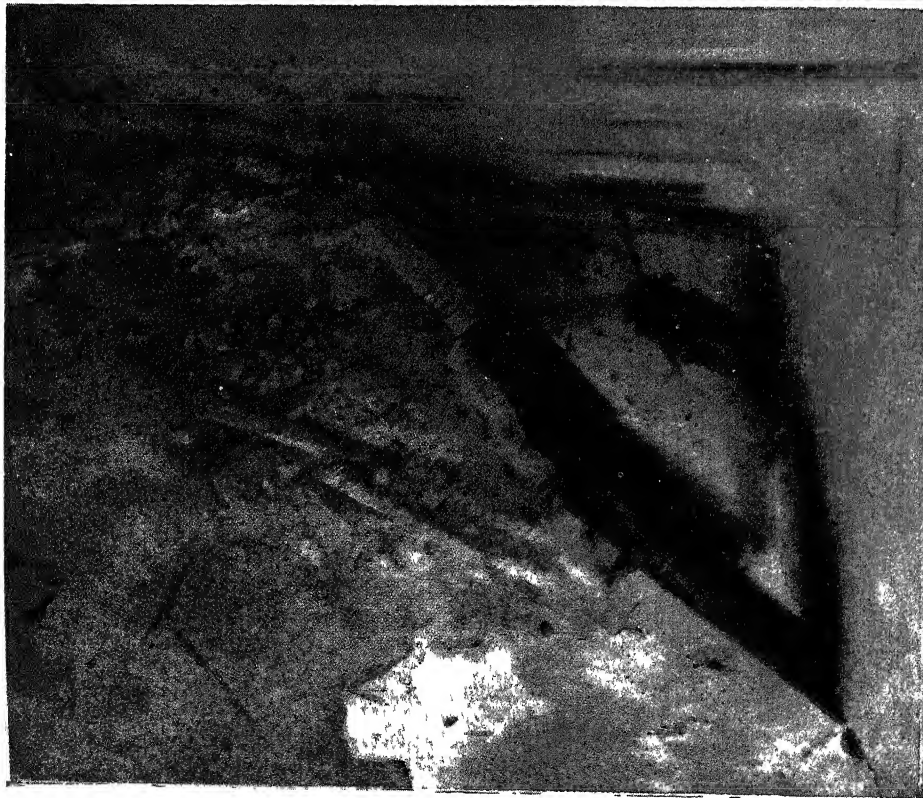
A.A. gunfire and aircraft interception brought down 306 enemy



The camera can record the results of air raids but only the artist's brush can do justice to the fantastic horror of a raid while it is in progress. These pictures of London under the German air attacks of 1940-41 were painted by men in the London fire service, J. Wallace Orr (top) and E. G. Turner

AIR RAIDS: FIRST-HAND IMPRESSIONS BY N.F.S. ARTISTS

Lower picture, by courtesy of the Countess of Shaftesbury



Two more eye-witness impressions by artists serving with the London fire service during the German air raids of 1940-41. They show (left) a house collapsing on two firemen in Shoe Lane (by Leonard Rosoman), and firemen working among the burnt out ruins of St Andrews church, Holborn (by Bernard Hadstone). These also were among the subjects shown at an Exhibition of Paintings by Firemen Artists, held at the Royal Academy in the autumn of 1941.

AIR RAIDS - FALLING BUILDINGS AND SMOULDERING RUINS DURING LONDON'S ORDEAL BY FIRE AND BOMBS

Left, picture, Crown Copyright, all four paintings reproduced, by courtesy of War Artists Advisory and Firemen Artists Committees, from direct colour photographs made by the Kodachrome process. To face page 217

raiders over Britain during 1943, 206 of them during the first six months of the year.

The diminution of the piloted raiders was still more noticeable in 1944, except for some brief but fairly heavy night attacks on London in Feb. and March. That was the year of the robot attacks. But almost at the end of the war in Europe, when the rocket attack was nearing its end, a brief return was made to the use of piloted aircraft. These last piloted attacks began on March 2, 1945, and were made by a variety of aircraft including Dornier 217, Focke-Wulf 190, Junkers 188, and Messerschmitt 410. They did not continue long, and the last "incident" of the whole war, recorded March 27, was due to a rocket.

Throughout the war London had 1,224 alerts. Total civilian casualties for London were 29,890 persons killed and 50,497 injured and detained in hospital. In all Great Britain during the war the air raid casualty list amounted to 60,585 persons killed and 86,175 injured and detained in hospital.

2. ON GERMANY, Etc.

The first British air raids on German soil were made in 1914 on airship sheds at Düsseldorf, Cologne, and Friedrichshafen by R.N.A.S. planes carrying four 20-lb. bombs. By 1917 the R.F.C. began to bomb military targets in the towns of western Germany. The weight of such attacks may be judged from the fact that a single ton of bombs dropped by a British squadron on Mannheim on Christmas Eve, 1917, was considered well worthy of record. The raids were continued in 1918, some damage being caused at Karlsruhe, where the main railway station was hit; at Cologne, where 33 bombs were dropped in one daylight raid in May; and to the Zeppelin sheds at Tondern.

In the Second Great War the first attack of R.A.F. Bomber Command was made on Sept. 4, 1939, when 10 Blenheim and 19 Wellington bombers flew to the Schillig Roads and Brunsbüttel respectively, to attack German warships. The Blenheims carried only two 500-lb. bombs each. Five Blenheims were lost. The pocket battleship Admiral von Scheer was slightly damaged. The Wellingtons did no observed damage at Brunsbüttel, and two aircraft were lost.

For many months afterwards a Cabinet instruction to the R.A.F. forbade the dropping of any bomb on German soil, and attacks were

therefore confined to warships. But when these were moored alongside docks, the bombs were not released lest some fell on shore. Losses were so heavy that these day attacks were soon discontinued. Thenceforward until almost the end of the war in Europe the R.A.F. heavy bombers were used with few exceptions, for night attacks.

During the winter of 1939-40, R.A.F. bombers flew far over Germany, over Czecho-Slovakia, and even to Warsaw and Vienna to drop leaflets. The long-distance leaflet raids were made by Whitley bombers of No. 4 group, using Villeneuve aerodrome in France as a staging post. The texts of the leaflets were kept secret from the British public. The excursions were good navigational exercises. They were also useful as reconnaissances. Little opposition was met.

When Germany attacked in the west in May, 1940, the French High Command required all Allied heavy bombers to be solely concerned with the immediate land battle. Up to the collapse of France the targets of Bomber Command were chosen by the French High Command. The *Comité de Guerre* insisted that no bombs should be dropped over troop concentrations in Germany lest they caused civilian casualties. Thus the first Allied bombing attacks on land targets were made over Norway, Holland, Belgium, and Luxembourg.

British Bombing Policy

However, on June 17, 1940, a bombing policy began that was solely British. Attacks were made that night on military objectives in Gelsenkirchen, Homburg, Wanne-Eickel, Essen, Hamburg, Aachen (Aix-la-Chapelle), Duisburg, Rheiydt, and Coblenz. At that period Bomber Command was not a large force; its greatest effort had been to muster 92 bombers to stand by to attack the German fleet during the invasion of Norway. The aircraft were all two-engined—Whitley, Wellington, and Hampden strategic night bombers and Blenheim day bombers. At the outset of the new policy, night bombers were sent out singly to pin-point and attack individual targets. Bombs weighing more than 500 lb. were very rare; 250-lb. bombs were the more usual load.

When Italy declared war in June, 1940, R.A.F. action against that country was obstructed by the French. A force of Wellington bombers sent to Salon aerodrome,

near Marseilles, was not at first allowed to take off to raid Italian targets. This opposition was withdrawn in time to allow targets in Genoa and Milan to be bombed on the nights of June 15 and 16, 1940. Meanwhile the first raid on Italy had been made from the U.K., on the night of June 11, Whitley bombers making a double crossing of the Alps to bomb the Fiat works, Turin, and the Ansaldo works, Genoa. Further attacks were made on Aug. 13 and Oct. 20, on industrial targets in Turin, Milan, Aosta, and elsewhere. Three attacks were made in Nov. and three in Dec., the most important target being the oil refinery and stores of Porto Marghera. Southern Italy was attacked for the first time on Oct. 31, 1940.

By the end of 1941 the power of Bomber Command had risen to a striking force of about 300 strategic bombers, with a proportion of 4-engined heavy bombers, of which 539 had then been built and delivered. The first 4-engined bomber, a Stirling, was in operation Feb. 10, 1941.

French and German Ports

Attacks had become less dispersed. On Dec. 17-18, 1941, a force of 101 night bombers attacked Brest, where lay the German battleships *Scharnhorst* and *Gneisenau* and the heavy cruiser *Prinz Eugen*. This was part of the great assistance given by Bomber Command in the waging of the battle of the Atlantic (*q.v.*). In the war against U-boats and other German warships of every kind, Bomber Command's attacks on Continental ports between Aug., 1941, and Feb., 1942, included 34 on Brest, 18 each on Le Havre and Boulogne, 15 on Dunkirk, 13 on Ostend, 12 on Cherbourg, 5 on Rotterdam, 4 on St. Nazaire, 2 each on Lorient, Calais, and Antwerp, and one on Bordeaux. Bombers were escorted by fighters in many heavy day attacks on the German warships at Brest and the submarine bases at St. Nazaire and Lorient. Even heavier attacks were made in the same period on the German ports where warships, U-boats, and aircraft were built and serviced, *e.g.* Emden, Hamburg, Kiel, Bremen, and Wilhelmshaven.

Attacks on such naval targets continued to the end of the war in Europe. The battleship *Tirpitz* and the cruiser *Prinz Eugen* were twice attacked where they lay in Trondhjem Fjord towards the end of April, 1942.

But the bombs of those days had little effect on heavily armoured ships, and the bomb-sights then used were inadequate for sighting such targets accurately from the great height needed to allow bombs to accelerate to high-impact velocity. It was not until Nov. 12, 1944, that the Tirpitz was sunk, in Tromsø Fjord, by the bombs of 29 Lancasters. These aircraft were equipped with the distant-reading gyro-magnetic compass feeding as a computer into the Mark XIV bomb-sight, and they carried streamlined 12,000-lb. armour-piercing bombs, which, falling from a height of 10,000 ft., impacted at a speed exceeding the 743 m.p.h. of sound.

The Big Bombs

Development of the bombing war was marked by the increasing weight of bombs. The first 4,000-lb. bomb fell on Kiel, March 31, 1941; the first on Italy, at Naples, Oct. 21, 1941; the first on occupied France, on the Matford works, Poissy, April 1, 1942. The first 8,000-lb. bomb fell on Karlsruhe, Sept. 2, 1942; on Italy, at Turin, Nov. 28, 1942. The first 12,000-lb. bomb fell on the Gnome-Rhône aero-engine works, Limoges, Feb. 8, 1944. All these bombs, commonly called block-busters, were normally used against specific targets where concentrated blast effect would produce the greatest results.

Streamlined armour-piercing bombs of large size were next introduced, with tail-fins designed to make them spin and impact with the accuracy of a shell. The streamlined 12,000-lb. bomb (Tail-boy) was first used against Le Havre harbour, June 14, 1944, to raise tidal waves among R-boat concentrations and swamp E-boat pens. The Germans constructed their submarine pens to withstand bombs of 7,000 to 8,000 lb., and the 12,000-lb. bombs took them by surprise, penetrating the concrete roofs at Brest. These bombs were also used against the Walcheren dykes on Oct. 3, 1944, and on two of the Rhine dams later the same month. The 22,000-lb. bomb (Grand Slam) was first used against the twin viaducts at Bielefeld, March 14, 1945; against the rly. viaduct at Arnsberg, March 15; against both these targets, March 19; against Bremen, March 21; against Bielefeld and Bremen rly. bridges, March 23; against the U-boat pens at Farge, March 27. Only R.A.F. British-designed bombers could carry these huge

bombs, and only specially modified Lancasters were capable of carrying the 22,000-lb. bomb, which measured 25 ft. 5 ins. overall length, and 3 ft. 10 ins. in diameter.

U.S.A.A.F. bombers in Europe did not carry bombs exceeding 2,000 lb. and lifted a maximum bomb load of only 5,000 lb. They devoted their ever-increasing activities to collaboration in the all-embracing scheme of bombing inaugurated by Bomber Command. The first U.S. attack, made Aug. 17, 1942, by 12 unescorted Fortress bombers, dropped 18 tons of bombs on Rouen rly. yards. Throughout 1942, U.S. attacks were confined to targets in occupied country, e.g. the Fives-Lille steelworks in Belgium, the Potez airframe factory at Méaulte, and shipyards at Rotterdam, and to various operations connected with the U-boat war.

Area Bombing

Meanwhile R.A.F. bombers were regularly dropping 4,000-lb. and 8,000-lb. bombs on German industrial targets in raids by 200 to 600 night bombers. The development of radar (*q.v.*) enabled mass raids to be made at night even under conditions of bad visibility, then quickened their speed and improved their accuracy. Eventually radar enabled air crews to see the night-obscured or cloud-obscured ground and to recognize towns or large factories. It penetrated all camouflage. A new experiment began with the attack on Lübeck, March 28, 1942, in which 304 tons of bombs fell in 180 mins. This was the first real British attempt at area bombing. The next month Rostock was bombed on four successive nights, and similar attacks followed on Stuttgart and Mannheim. Then on May 30 a force of 1,043 bombers was mustered, including aircraft from operational training units, and Cologne was bombed for 90 minutes. The greater part of the force consisted of Wellingtons, but there were also some Stirling, Halifax, and Lancaster 4-engined bombers. Forty-two were lost; but nearly 3,000,000 sq. yds. of Cologne were destroyed. Two more experimental night raids by 1,000 bombers followed, on Essen, June 1, and Bremen, June 25. The former was a failure, for the bombers did not find Krupp's works and dropped all their bombs 15 m. away from it.

Improved practice and the increasing use of 4-engined bombers steadily raised the scale from that

set by the first 1,000-bomber raid—750 bombers an hour dropping less than 1,000 tons—to 1,800 bombers an hour dropping 5,000–6,000 tons. But there were few targets which could absorb such a weight of attack in one blow without waste of effect due to the falling of bombs where damage was already complete. Saturation damage was achieved by an average ratio of one ton of bombs to every 50 inhabitants. So the population size of a city or section of a city to be attacked determined the size of the force employed, and the average heavy raid was subsequently made by 450–600 aircraft bombing for 15–25 mins. On March 12, 1945, however, over 1,000 Lancasters and Halifaxes dropped 4,900 tons on Dortmund in daylight with fighter escort.

Pathfinders and Master Bombers

The Mark XIV bomb-sight was first issued in Aug., 1942, to the Pathfinder force of Bomber Command, and later to all the command's aircraft. U.S. bombers employed the same sight under the designation T.2. The task of Pathfinder aircraft, manned by the most experienced air crews, was to outline the target area by pyrotechnic flares. The colour of the flares varied from one attack to another in order to thwart the Germans in any device of using decoy flares accompanied by dummy fires.

Later this technique was improved by the use of a master pilot who controlled the entire force by radio telephone and checked that the markers were in the correct position before the bombs went down. This development arose from the tactics employed on May 17, 1943, by Wing Commander G. P. Gibson, V.C. He was leading a force of 19 Lancasters in a day attack on the Möhne, Eder, and Sorpe dams. The breaching of the first two caused a torrent of 336,000,000 tons of water to sweep through industrial valleys, inundating Kassel and disrupting the power stations (*see picture, page 209*).

The first fully planned attack using the master-bomber technique was made against the Peenemünde V-weapon research establishment, Aug. 17, 1943.

Attacks were made in accordance with the requirements of a target selection committee, working in conjunction with the ministry of Economic Warfare. Broad direction of the campaign came from the minister of Defence and the chiefs of staff committee.

C-in-C. Bomber Command selected his target for the night with regard to priority, time of year (long-distance raids required long nights), weather forecasts, bombing battle plan, and variation of tactics to outwit German defences. Types of bombs were selected to suit the different targets. Often bomb size was in inverse ratio to the dimensions of a target. The smaller the target the larger the bomb, so that a near miss could be almost as destructive in its effect as a direct hit; on the other hand, against large built-up areas comparatively small incendiary bombs were capable of inflicting the greatest damage.

Day Attacks

Certain types of "precision" target were attacked by day with both medium and heavy bombers. In 1941 Blenheims bombed at various times Cologne power station, Ijmuiden steelworks, Rotterdam harbour, the chemical plant and power station at Mazingarbe, and targets in Rouen, Hazebrouck, Boulogne, Gosnay, Le Havre, and near St. Omer. They suffered heavy losses. In 1942 they became "intruders," attacking by night aerodromes in occupied countries.

In March, 1942, Bomber Command made on the Matford works, Poissy, its first attack with U.S.-built Boston medium day bombers. Other raids in which Bostons were used were made, with fighter escort, on such "fringe" targets as Caen, Le Havre, Rouen, Hazebrouck, Cherbourg, and Ostend. But when the type of bomb required was too heavy or the distance too far for medium bombers, the heavy bombers designed and armed for night operations had to be used by day for precision bombing. They flew without escort, but British fighters made diversionary sweeps to keep German fighters down. Thus the M.A.N. U-boat Diesel engine factory at Augsburg was attacked on April 17, 1942, by 12 Lancasters, of which 7 were lost. Like the Blenheims and Bostons, the Lancasters flew at tree-top height. Other major day attacks by heavy bombers in 1942 were made on submarine building yards at Danzig, Flensburg, and Lübeck, the Schneider-Creusot armament works in France, and the Philips radio factory at Eindhoven, Holland. But the risk was very great. Eventually night illumination of special targets became so developed that an individual building

within a target area of 500 sq. yds. could be accurately bombed from a low height.

Until almost the end of the war in Europe, British heavy bombers were armed only with .303-in. machine-guns, with a range of fire unequal to that of the cannon-guns of German fighters. Even at night, losses were often heavy. From a force of 800 attacking Nuremberg on the night of March 30, 1944, 96 were lost.

The U.S.A. 8th A.F.

U.S. heavy day bombers were equipped with at least 12 $\frac{1}{2}$ -in. machine-guns. Even so, their losses on deep penetration raids were at one time so heavy that a switch to night operations was seriously considered. Instead, the U.S.A. 8th A.F. embarked on a policy of smashing the German air force. Long-range day fighters were introduced, and a great programme of attack on German air factories was begun. The first target of the 8th A.F. in Germany was Wilhelmshaven, Jan. 27, 1943. With this, the trial period for both the R.A.F. and the 8th A.F. was over, and the real bombardment of Germany and occupied Europe began. From the beginning of 1943 onwards a total of 1,877,500 tons of bombs was dropped, of which British and U.S. strategic bombers were responsible for all but 92,000.

On April 17, 1943, 107 Fortresses bombed the Focke-Wulf fighter assembly plant at Bremen. The Germans, instead of rebuilding, removed the plant with its workers to Marienburg, on the Polish-Pomeranian frontier. On Oct. 9, 1943, U.S. bombers damaged 70 p.c. of the new factory. The Germans began to rebuild. On Oct. 9, 1944, U.S. bombers destroyed nearly 70 p.c. of the rebuilt factory. In these three attacks, typical of numerous others, the 8th A.F. lost 76 bombers and 8 escorting fighters, but they shot down 217 German fighters.

Oil and Railways

The Allies gained a valuable group of airfields in Italy with the capture of Foggia, Sept. 27, 1943. From there the U.S.A. 15th A.F. struck into Austria and S.E. Germany and eastward over the Balkans. From bases in the Middle East this force had already struck at the Ploesti oilfields in Rumania. From Italy it struck again and again until the output of these oilfields was a mere trickle. They also struck at natural and synthetic oil plants in Austria, Hungary, Po-

land, and Germany, and at the aircraft factories around Vienna and in southern Germany.

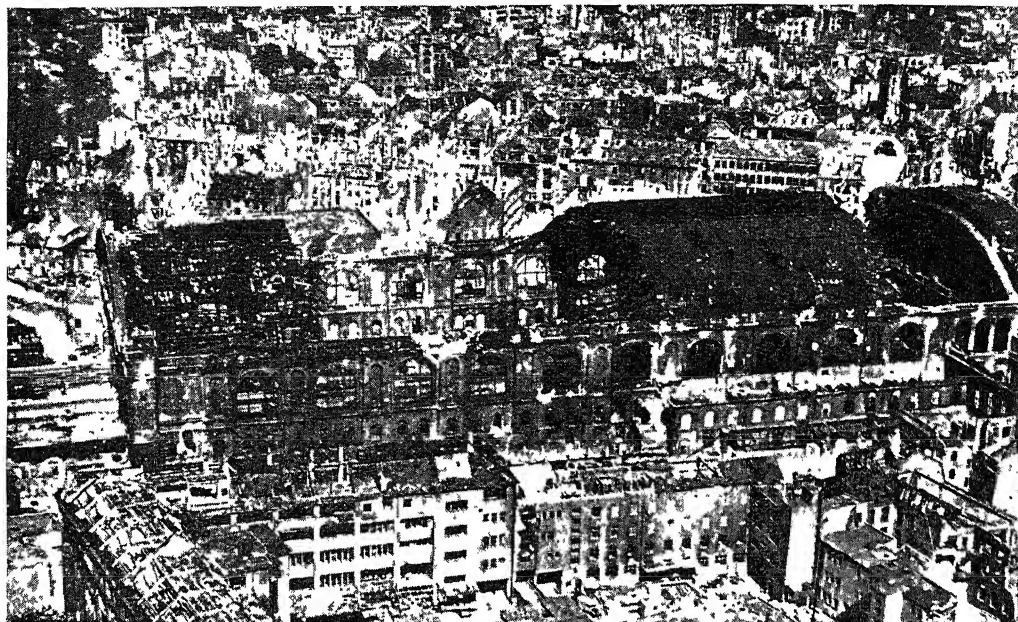
In reply Germany attempted to guard her vital supply services by concentrating almost all her aircraft production on fighters, as Great Britain had been obliged to do in 1940. Large scale air battles developed, and many bitter combats were fought over Germany and Austria between July, 1943, and March, 1944, by which time the Americans had won the battle. Throughout all its operations the 8th A.F. alone destroyed 15,439 aircraft; 11,232 in the air, 4,207 on the ground. German industry was forced underground. But it was too late for full production ever to be developed in those factories buried in the Harz and Thuringian mountains, where jet-fighters and V-weapons were made 800 ft. below the surface.

In March, 1944, the U.S. bombers added their weight to the British attack on oil installations. The combined forces smashed the oil plants of Leuna, Magdeburg, Politz, and the Ruhr. Before the defeat of Germany her oil production fell from a maximum output of 15,000,000 tons a year to zero.

The third great series of targets for combined British and U.S. bombers was the German rly. system. Photographs showed that by March 29, 1945, virtually nothing was moving in 26 rail-yards of the Ruhr.

The last bombing raid on Europe of the 8th A.F. was against the Skoda works, Pilsen, Czecho-Slovakia, April 25, 1945. By then the 8th A.F. had dropped a total of 701,300 (American) tons of bombs, distributed as follows: railyards 204,413; airfields 90,821; oil plants and chemical works, 75,019; aircraft factories, 40,837; U-boat yards and pens, 33,423; bridges and viaducts, 33,065; V-weapon sites, 30,971; armament plants, 25,819; other industrial targets, 16,040; fuel dumps, 8,941; ordnance depots, 7,046; ball-bearing plants, 5,086; experimental stations, 2,335; inland canals, 2,110; military installations and tactical targets, 51,512; all other targets, 67,882.

During 1943 nine of Germany's main industrial cities were so devastated by Bomber Command that they were forced to consume more than they could produce. Hamburg was attacked with great intensity from July 24 to Aug. 3, 11,000 tons of bombs falling on



Air Raids. Devastation caused in Berlin by Allied bombing in the later stages of the Second Great War. Here the shell of the Anhalter station is seen in the midst of a heavily damaged area

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city, docks, and shipbuilding yards. The area suffered about 67 p.c. damage. Barmen, one of the twin towns of Wuppertal, was 98 p.c. devastated by a single 1,000-ton attack, May 29, 1943. The real attack on Krupp's works at Essen began with raids in March and April, 1943. By the end of the year it was estimated that the works were permanently reduced to 60 p.c. capacity. In March and April, 1944, two 2,000-ton attacks were made on the partly repaired works, causing more damage than all the 1943 attacks. Out of 200 large buildings only 6 escaped.

On March 11, 1945, 4,500 tons were dropped on Essen, which received in all 15 major attacks. When Allied forces entered the town the following month, they found the Krupp works had been reduced to a series of empty shells of buildings and heaps of rubble.

Air Battle of Berlin

In the first R.A.F. attack on Berlin, Aug. 25, 1940, 22 tons of bombs were dropped. Subsequent attacks showed a gradually rising tonnage, but it was not until Nov. 18, 1943, that the real air battle of Berlin began. Between then and the following March, 16 major attacks were made by British heavy bombers, which released a total of about 25,000 tons on the Reich capital and

destroyed over one-third of the city. Later raids brought the total of major attacks on Berlin to 22. Mosquitoes of Bomber Command also carried their loads to Berlin with great regularity, making more than 170 attacks and dropping in all 7,000 tons of bombs. During the closing stages of the war they bombed Berlin on 36 consecutive nights. During this air battle of Berlin Bomber Command alone dropped 40,845 tons on the city, causing the destruction of 2,700 acres.

The 8th A.F. joined in the battle in 1944, with four attacks in March, one in April, and four in May. On June 21 over 1,000 Fortresses and Liberators dropped 1,300 tons on the city in a few minutes. On March 18, 1945, a still more formidable fleet of 1,000 Fortresses and 300 Liberators, escorted by fighters, dropped 2,500 tons on Berlin in daylight.

In the final surface assault on Berlin the Red Air Force was reported to have used 4,000 aircraft by day and 1,000 by night, but this was a tactical offensive. Moreover, the figures given are possibly those of aircraft sorties rather than of machines.

Bomber Command lost 9,120 aircraft in all these operations. It destroyed 758 German aircraft. In addition to Berlin and Essen, the following cities received major

attacks of from 500 to 5,000 tons: Cologne, 18 attacks; Duisburg and Stuttgart, 12 each; Dortmund and Hamburg, 11 each; Ludwigshafen, 10; Kiel, Dusseldorf, Homburg, Nuremberg, 8 each; Munich, Wanne-Eickel, Mannheim, Gelsenkirchen, Bremen, 7 each; Frankfurt - on - Main, Hanover, Buer, 6 each; Kamen, Bochum, Brunswick, Sterkrade, Neuss, Munchen-Gladbach, 5 each. Ten other cities received 4 such attacks; 14 cities and the Mittel-land and Dortmund-Ems canals, 3; 32 cities, 2; and 95, one. In all, 473 major attacks were made, including 70 against rlys., 69 against oil targets, 13 against airfields. Of these attacks 55 were on targets in France; Belgium had 11; Holland, 6; Czechoslovakia, 2; Norway, one. No strategic attacks of the kind were made on Italy.

The last attack by Bomber Command's heavy bombers was made against an oil target at Vallo on the night of April 25, 1945; but Mosquitoes bombed Kiel the following night for the sixth night in succession.

Red Air Force bombers were mostly tactical and medium bombers carrying relatively small bombs. The only 4-engined bomber used in any numbers was the TB-7, which could carry a bomb load of 8,000 lb. on short

range, or 4,400 lb. at a maximum range of 2,500 m. The TB-7 was used in night raids over Germany early in 1943, and on industrial targets in Hungary and Rumania. In 1944 it attacked lines of communication behind the retreating German armies. The other Soviet strategic bomber was the two-engined DB-3 and its development the DB-3F, both of which resembled the U.S. Douglas DC-3 civil transport or Dakota troop transport. The Soviet DB-3 carried a maximum internal bomb load of 3,300 lb. and was used to attack industrial and military targets, e.g. at Königsberg, Berlin, Tilsit, Helsinki, Bukarest, Budapest, and Breslau. At no time was the Red Air Force employed in combined operations to give bombing support to Allied zones in the west, though such support was frequently given to the Soviet armies by both R.A.F. and U.S.A.A.F. bombers. In 1944 U.S. bombers (and fighters) flew across Europe from U.K. or Italian bases, and alighted on Soviet territory, but by the end of that year the armies had drawn so close that such shuttle bombing had lost its advantage and was discontinued.

The following figures, given in British tons, show the growth of the annual tonnage of bombs dropped by the R.A.F. (Bomber Command in the U.K. and the R.A.F. element of the Allied air forces in Italy) and the U.S.A.A.F. (8th A.F. in the U.K. and 15th A.F. in Italy):

	R.A.F.	U.S.A.A.F.
1939	31	—
1940	13,000	—
1941	32,000	—
1942	45,500	1,500
1943	157,500	48,500
1944	547,000	578,500
1945	191,000	263,000

986,031 891,500

Air Raid Shelter. Structure to afford protection against aerial bombing. Deep shelters, excavated far below ground and strengthened with steel and reinforced concrete, with top cover of similar materials and a great depth of soil, can be constructed to protect key personnel or to accommodate factories, ammunition stores, control rooms, power plants, etc. A filtered and conditioned air supply is provided, with means for preventing this air from contamination by poison gas. Such a shelter will give protection against a direct hit by a bomb, though the improvement in penetration and the steady increase in size of aerial bombs as

time goes on provides a parallel to the "big gun *versus* armour" controversy.

Short of constructing deep shelters, use can be made of suitable existing tunnels, such as those of the deep underground railways. In Sept., 1940, the London Underground Rly. stations were opened to shelterers at night; a short section of the central "Tube" railway tunnel, between Aldwych and Holborn, was closed to traffic and devoted to the purpose of a shelter. Later, bunks were provided on the station platforms, and facilities arranged for food and refreshment. At the peak period 177,500 persons were being accommodated nightly; later the number fell to about 100,000. By arrangement with the government, extensions were put in hand in 1942 which would give additional accommodation for about 65,000 persons, and would provide in due time for a post-war development of the Underground rly. system. Eight deep tunnel shelters were completed in 1944, five being in use that July, giving night shelter to 12,000 in the month. Other types of deep shelter were contrived in caves, as at Dover and other places along the Kent coast where existing caves and the chalk cliffs afforded suitable natural facilities.

Trench Shelters

The simplest protection against aerial bombing is that given by slit trenches dug in the soil. Such trenches were dug in the London parks and other open spaces during the Munich crisis of Sept., 1938—open, unroofed excavations. Later in the year many of the trenches were made permanent, by being lined with reinforced concrete, roofed with arched steel members or with concrete slabs, and covered with soil. At this period London Transport constructed somewhat similar shelters excavated into embankments and buttressed with brickwork; many industrial concerns also provided protection for their workers, sometimes in fairly deep shelters but for the most part in surface or very shallow ones. The British government had announced in 1936 that the construction on any extensive scale of shelters which would be proof against direct hits by bombs was considered impracticable, a view which took some years to gain general acceptance.

Early in 1939 the Home Office authorised the manufacture of steel shelters which became known

as Anderson shelters (*q.v.*). Corrugated steel sheets of stout gauge, bent into an arched form, constituted the main body of the shelter, which was completed by vertical sheets at back and front. The steelwork was erected in a pit excavated in the ground, so that about half its height was below the surface. The soil removed was packed against the steel sides and heaped up over the arched roof. Strictly, therefore, the steelwork acted mainly as a "form" to retain the earth, and the latter provided the chief protection against penetration by bomb splinters. The Anderson stood up well against debris flung against or on it by bomb explosions, and also resisted blast satisfactorily. The standard pattern, supplied free to poorer people in vulnerable areas accommodated six persons.

Later Types

In view of later experience of bombing it became clear that the ordinary domestic house offered good protection against blast or the penetration of bomb fragments. The Morrison shelter (*q.v.*), a steel shelter for indoor use, was introduced by the British government in the early months of 1941. This was a table-like structure with open sides which could be closed in with a stout steel lattice. During the daytime it served as a table; at night, with a mattress under, it became a sleeping place.

Larger shelters on the Anderson principle, with steel framework, were built for factories and other concerns where many people needed protection. Basements of strongly built office blocks or other business premises were strengthened and used as emergency shelters. Similar accommodation was arranged beneath tenements and blocks of flats. Archways and vaults were used where available.

Surface shelters, made of brickwork 13½ ins. thick, roofed with concrete, and reinforced with steel, were built in the roadways or on wide footways of central London and other cities, and were constructed also in the suburban districts. They came through the ordeal well, and stood firm even when buildings all around had collapsed. They served to give refuge to people caught in the streets in daytime, or to those in residential areas where the houses were of light construction. Many were fitted with bunks.

For key personnel in factories and other buildings, whose duties

kept them out in the open during air raids, individual steel shelters were provided to be used in time of imminent danger. These were heavy, portable bell-shaped structures, with a door that could be closed by the occupants after entering. The strong steel walls were proof against penetration by bomb fragments, while the conical shape caused debris from collapsing buildings to fall off or, at the worst, to arch over the shelters.

In other parts of Europe protection against aerial bombs took the form mainly of strengthened basements or similar existing structures. Advantage was taken of caves, vaults, disused tunnels, etc. Extensive factories or other important industrial works were sited beneath hills, where entries could be made at ground level by a sloping adit. Disused mine galleries were utilised in the same way. In German cities immensely strong buildings of concrete, with walls and roofs nearly 10 ft. thick, were built as communal shelters. They were windowless, and were lighted and ventilated artificially. Moscow used its underground railway as a shelter, and resorted otherwise to basement shelters. The common practice in Continental towns of building working-class dwellings in the form of tenements or blocks of flats facilitated the use of basements or lower stories as shelters, suitably strengthened and protected by blast walls.

Air Raid Warning. In the series of moonlight raids on London made by German aeroplanes in 1917-18 a system was adopted of warning the public to take cover by the firing of maroons and the sounding of police whistles, the "all clear" being subsequently sounded by relays of Boy Scout buglers on bicycles. Experience of air bombing of large towns in the Spanish Civil War of 1936-39 made it clear that a more efficacious and more widespread system was necessary. A new system of signals planned in Great Britain in 1937 as part of A.R.P. experiments led to the adoption in 1938 of the siren or hooter. For two minutes this emitted a fluctuating or warbling note of a varying pitch and high penetration. These were supplemented by street warnings in the form of short, sharp blasts from whistles blown by police or wardens. The "raiders passed" signal was given by a steady note from the siren, also of two minutes' duration. In the event of a gas attack it was planned to give the

alarm by hand rattles, with handbells to sound an all-clear. Responsibility for sounding public warnings lay with the police.

In Sept., 1940, the Prime Minister, Mr. Churchill, referring to the "banshee howlings" of the sirens, announced that the duration of the signal would be reduced to one minute, and that it must be regarded as an "alert" rather than an alarm, so that interruptions to work in factories and offices should be minimised. A system of centralised warnings of imminent danger was introduced into government offices and war factories on Oct. 14, 1940; and other organizations followed a similar practice by introducing "roof-spotters" during alert periods. The public warnings were further modified in London and S.E. England during the flying-bomb attacks, June-Sept., 1944. Because of the frequency of the attacks (on one occasion London had 15 alerts in 24 hours) the alert was further reduced from eight wails to five. In the streets of London so many conflicting forms of "imminent" warnings could be overheard by people to whom the taking of cover for only a few seconds might be a matter of life or death that a Home Office order was issued to unify these, and to supplement them with local imminent warnings in the streets, to be sounded on klaxon horns. But the attack was defeated before this scheme was put fully into operation.

The first air raid warning in Great Britain was sounded at 11.21 a.m., Sept. 3, 1939; this was due to a French aircraft not immediately identified. The last was on March 28, 1945. The system of warnings was officially discontinued from May 2, 1945.

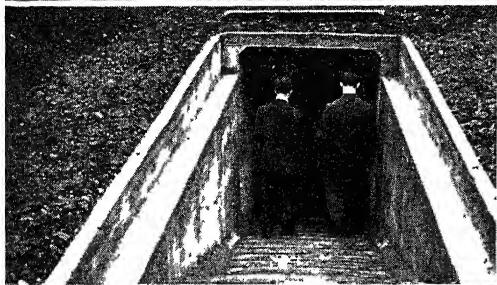
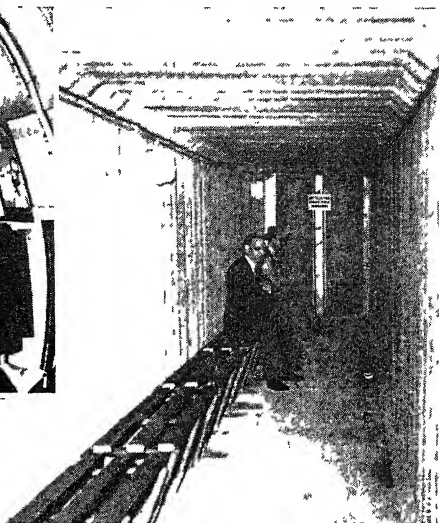
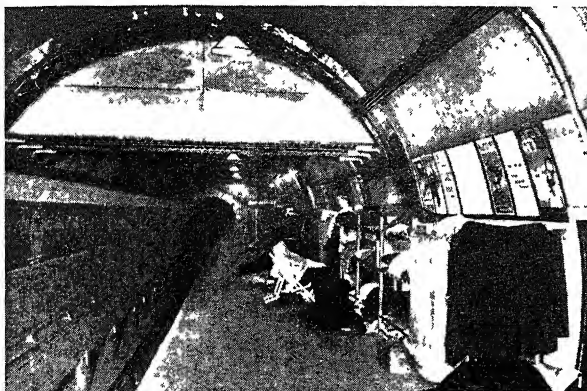
Germany adopted a system on similar lines to that of Great Britain, though in later stages of the war public warnings of approaching raiders were also given by radio. In France the system was again similar, though much less organized, pre-war preparations being chiefly carried out in the industrial north. China's system was tested as early as 1937, when she was invaded by Japan. Sirens were sounded in the larger towns, but in rural areas bells were used.

Air Records. Although it is quite usual for achievements carried out in the air to be described as "record" flights, strictly speaking no international air record is considered valid unless the performance has been officially verified by the governing

body, which is the Fédération Aéronautique Internationale. This organization is formed by the affiliation of institutions similar to the Royal Aero Club of Great Britain. Validity of a national air record depends on the claim being accepted by the national affiliated club in the country concerned. During the First Great War when the aeroplane underwent striking advances in design so that its performance moved forward proportionately the F.A.I. was unable to meet, and consequently no international records were passed during the period 1914-1918. But in the years between that time and the Second Great War enormous strides were made not only in speed but also in height, duration, and long-distance records. Most of these records were completely eclipsed by the performance of military aircraft used by the belligerents in the Second Great War, though, again, the F.A.I. was prevented throughout hostilities from functioning in regard to international records. By 1944, for example, fighter aircraft driven by the revolutionary types of power units, and known colloquially as "jet-planes," were capable of speeds in excess of 500 m.p.h. in level flight, while other machines powered with conventional types of engine were able to fly level at more than 450 m.p.h.

The more important air records achieved by airmen of the world in the past thirty-five years or more are:

SPEED. First official record, Marcel Prévost (Reims, Sept. 29, 1913), 124.5 m.p.h. Since then this speed has been surpassed innumerable times, and within twenty years the speed record was brought up to 440.702 m.p.h. This was achieved by Agello in a Macchi-Castoldi seaplane on Oct. 23, 1934. Three years earlier Flight Lieutenant G. H. Stainforth had set up a world's record when he reached an average speed of 407.5 m.p.h. in four runs with the Supermarine S.6 racing seaplane. It is to be noted that the highest speeds were attained by seaplanes, for at that time (1931-1934) the high landing speeds and lack of long runways on aerodromes made record-breaking with landplanes hazardous, if not impossible. It was the development of racing seaplanes for Schneider Trophy (*q.v.*) contests that actually produced this result. Thus in 1933 the world's speed record for landplanes stood at 308 m.p.h., exactly 100 m.p.h. less



1. Three-tiered bunks lining the platform of a Tube railway station, in this case Covent Garden
2. Entrance to an underground "trench" shelter in Green Park, London. 3. Inside the Green Park shelter.

4. Steel "pill-box," a type designed for the police and for sentries. 5. Surface shelters in Haymarket, London. 6. Anderson shelter, for domestic use, in course of erection 7. Two-tiered Morrison shelter for indoor use

AIR RAID SHELTER: VARIED TYPES FROM WHICH LONDONERS DEFIED THE NAZI BOMBS

than the seaplane record. The former was made by J. Wedell on Sept. 3, 1933, in the U.S.A., who flew a Wedell-Williams machine of 800 h.p. This record was surpassed by Howard Hughes, another American pilot, in 1935, when he established a record of 352 m.p.h. Then, five months before the outbreak of the Second Great War, a German, Fritz Wendel, claimed the world's air speed record after having flown his Messerschmitt Bf 109 R at 469.2 m.p.h.

The advent of jet-propelled aircraft during the war years made the setting up of new figures only a matter of time. On Sept. 7, 1946, a special version of Britain's first "jet" fighter, the Gloster Meteor, piloted by Gp. Capt. E. M. Donaldson, covered the official course off Littlehampton at an average of 616 m.p.h.—an increase of 10 m.p.h. over Gp. Capt. H. J. Wilson's record of the previous year, of 147 m.p.h. over that of 1939, and fast approaching the speed of sound.

During the Second Great War some remarkable high-speed flights were made across the North Atlantic by pilots of R.A.F. Transport Command both when engaged in delivering new aircraft to Britain and when transporting Allied statesmen and others from N. America to Europe. Outstanding among these flights was that achieved by Flight Lieut. H. C. Graham, who flew a D.H. Mosquito from Newfoundland to Prestwick, Scotland, March 30, 1945, in 5 hrs. 38 mins. The distance covered was 2,184 statute m., and the average speed was thus 387.6 m.p.h., or approximately $6\frac{1}{2}$ miles a minute. The machine was aided by a following wind. (See N.V. for later.)

HEIGHT. First official record, Legagneux (San Raphael, Dec. 28, 1913), 20,060 ft. Eight years later J. A. McCready broke the record by reaching an altitude of 34,184 ft. By Sept., 1936, the record fell to an R.A.F. pilot, Squadron Leader F. R. D. Swain, who climbed to 49,967 ft. in a Bristol aeroplane. Again, this was exceeded when on June 30, 1937, Flight Lieutenant M. J. Adam flew his Bristol 138 to 54,050 ft. On Oct. 22, 1938 an Italian, Lt.-Col. M. Pezzi, eclipsed this by flying his Caproni biplane to 56,100 ft. (See N.V.; also Balloon.)

DURATION. First official record, Landmann (Johannisthal, June 26-27, 1914), 21 hrs. 48 mins. 45 secs. By 1931 this remarkable record, which had been repeatedly

broken, fell to two Americans (Lees and Brossy), who remained in the air in their Bellanca aircraft for 84 hrs. 32 mins. Refuelling in mid-air, which was introduced a few years after the end of the First Great War, enabled aeroplanes to remain in the air for hundreds of hours, and so records of a new category were recognized. In 1929 two pilots, Mendell and Reinhart, of the U.S.A., flew non-stop for 246 hrs. 43 mins.; this exploit was eclipsed in the same year, when a Curtiss machine (flown by Dale Jackson and Forest O'Brine) flew for 420 hrs. 17 mins. In 1930 this duration-with-refuelling record stood at 553 hrs. 40 mins. (pilots J. and K. Hunter). (See also N.V.)

DISTANCE. First official record, Sequin (France, Oct. 13, 1913), 633 miles. Comparison between this distance traversed by an aeroplane and the distance record made twenty years later gives an idea of the immense progress made in the development of aeroplanes. Thus, on August 5-7, 1933, a Blériot flown by Rossi and Codos went from New York to Rajak, Syria, non-stop and in a straight line. The distance was 5,654 m.

On July 13-15, 1937, a Russian A.N.T. aeroplane, with M. Gromov as its captain, flew non-stop from Moscow to San Jacinto, California, the distance being no less than 6,305.7 miles. This flight was surpassed by that achieved by two Vickers Wellesley monoplanes flown by R.A.F. pilots, with Squadron Leader R. J. Kellett as the leader, from Ismailia, near the Suez Canal, to Port Darwin, Australia. The distance in a straight line is 7,158.653 m. The pilot of the other machine was Flt. Lt. A. N. Combe.

The next official long-distance record was 11,235.6 m. non-stop, from Perth (Australia) to Columbus (U.S.A.), set up by a Lockheed Neptune of the U.S. Navy in Sept.-Oct., 1946. The chief pilot was Cdr. T. D. Davies, and the time 55½ hrs.

There is also a numerous class of record for performances made with passengers and loads. Records of height, of distance, and duration accomplished with sailplanes are also recognized. (See Glider.) In relation to the speed and distance records, it must be realized that an aircraft's speed over the ground is not the same as its speed through the air, unless it is still air. Therefore, when a speed record is being attempted, the aircraft is flown in a series of

runs in opposite directions, and distance records (other than those made in a straight line) are officially recognized only if the flight is made in a "closed circuit." See Atlantic Flights; Australian Flights; Cape Flights.

Aircrew. Any form of screw driven by an engine which gives motion to an aircraft. It may be a tractor airscrew which is located in the front of the fuselage or wings, or it may be a pusher airscrew, that is one arranged behind the engine and to the rear of the pilot's cockpit. In its simplest form an airscrew has two blades of aerofoil section set at a fixed angle. On rotating, these blades produce a circulation of air from which motive power is derived, as explained under Screw or Marine Propeller (g.v.).

The modern type of airscrew, other than that used for light aeroplanes, incorporates a mechanism whereby the angle of the blades can be varied to obtain greater efficiency throughout the different conditions of flight. Thus when an aircraft is taking off, the airscrew blades are set at a "fine" pitch angle so that maximum power is obtained from the engine. During level flight, however, the blades are re-set to a "coarse" pitch angle. These variable pitch airscrews can be actuated so that the blades are turned with edges facing the wind in flight. This is known as "feathering" and is done when an engine fails. When an airscrew is feathered the windmill effect is eliminated so that the engine ceases to be rotated and the ill-effects of vibration and the probability of further breakage, if parts of the engine or aircraft have been damaged, are prevented. Feathering also simplifies control of a multi-engined machine when one or more motors are out of action as it eliminates drag and reduces the angle of yaw. These variable pitch airscrews may be either hydraulically or pneumatically actuated.

The constant speed airscrew is a variable pitch type of airscrew with the pitch angle of its blades controlled by a governor mechanism. The engine speed desired by pilot or engineer is maintained irrespective of changes in the speed of the aircraft, because the airscrew blade angles are automatically altered by the governor to vary the load on the engine.

An airscrew development was the contra-rotating type in which two groups of three blades turn in opposite directions. The contra-

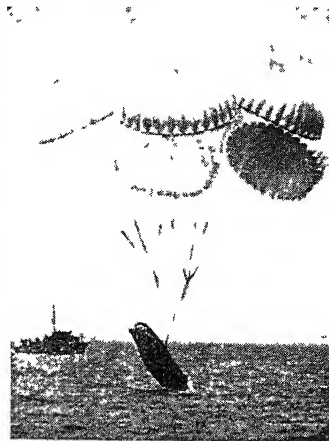
rotating airscrew consists actually of two two-blade, three-blade, or four-blade co-axially mounted airscrews which function together. This type of airscrew eliminates the pronounced torque reaction which occurs when the orthodox airscrew is used with very powerful engines. Through the contra-rotation the slip-stream is delivered back over the fuselage and tail of the aeroplane in a balanced flow so that controllability is much improved. Greater efficiency at high altitudes is another feature of this kind of airscrew. Some of the earliest airscrews were constructed of metal but, being of primitive form, were unsatisfactory; hence the wooden airscrew was developed. Airscrews of the present day have blades made either of plastic or other bonded wood laminations or of metal, and may have from one to eight blades.

Air-Sea Rescue. The Air-Sea Rescue Service was a development introduced by Great Britain in the Second Great War. Controlled by the directorate of air safety of the Air Ministry, it was formed in May, 1941, with the primary object of saving British and Allied airmen who had been forced down to the sea and, having taken to their rubber dinghies, were in need of assistance. The service was organized jointly by the Air Ministry and the Admiralty, and the system adopted entailed the cooperation of the Coast Guard Service and the Royal National Lifeboat Institution. A constant vigil was maintained by R.A.F. pilots who searched for others who were in distress. Coastal Command long-range flying boats and landplanes flew far out over the Atlantic to aid shipwrecked men as well as air crews.

Altogether, 5,721 R.A.F. and U.S. air crew were saved by the service in the North Sea and English Channel, 1,998 of their total being Americans. Over 3,200 air crew were rescued by overseas A.S.R. units, together with 4,665 soldiers, sailors, and civilians. In the Middle East, rescues were made from the desert almost as frequently as from the sea.

July, 1943, was an exceptionally busy month, A.S.R. saving 139 members of Flying Fortress crews out of 196. The service also figured prominently in the D-day operations of June, 1944.

Numerous types of aircraft were used, including the Supermarine



Air-Sea Rescue. Airborne lifeboat floating down within reach of the crew in a dinghy such as that seen below (centre)

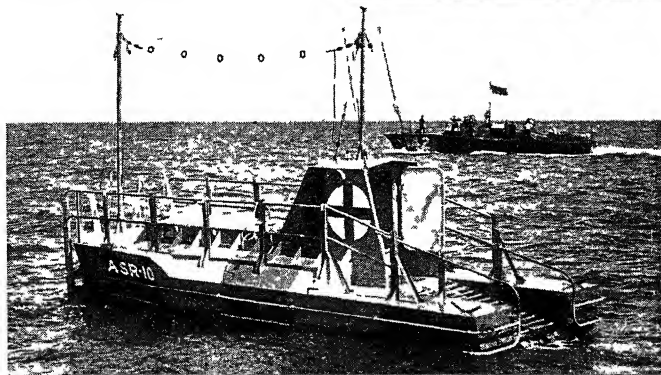


Walrus amphibian, Sunderland flying-boat, Westland Lysander, Lockheed Hudson, Avro Anson, Boulton Paul Defiant, Warwick, and Supermarine Spitfire. A most comprehensive equipment was introduced for this Air-Sea Rescue Service, among which were the specially devised rescue floats which were moored at many points around the British coast. These devices, brightly painted in yellow and red, were loaded with emergency food supplies, signalling apparatus, and also clothing. They were constructed with bunks and had cooking stoves.

The rescue launches, which were specially designed for the work, were for their size exceptionally seaworthy and fast. In order to defend themselves against enemy aircraft the launches were armed, guns being carried in turrets similar to those fitted to bomber aircraft. These high-speed launches cooperated with naval vessels of different classes and the work was often supplemented by trawlers and boats of the Royal National Lifeboat Institution. Airmen selected for air-sea rescue duties underwent special training.

The success of the air-sea rescue organization was due in no small measure to the ingenious devices incorporated in the equipment used in aircraft and ships.

In addition to dropping rubber dinghies to men in distress, the Air-Sea Rescue Service also dropped a lifeboat which, after release from its aircraft, descended to the water under three or more parachutes. It had two engines, sails, food, water, and medical supplies on board.



Air-Sea Rescue. Below, rescue launch arriving at a moored float to see that all is in good order. Above, a fast motor launch has intercepted and is picking up members of an air crew adrift in their emergency dinghy

AIRSHIP: SELF-PROPELLED BALLOON

Lord Ventry, Editor of *The Airship*

The earliest effective form of mechanically propelled aircraft, the airship, has had a chequered history, though, as seen in this account by a leading protagonist, its story is by no means completed. For the early history of balloon flights see Aeronautics. See also Balloons, and under specific airship names, as Akron; Macon; Rior; Zeppelin, etc.

An airship is a lighter-than-air craft which derives its lift from gas balloons and is mechanically driven, as distinct from the free balloon, which moves under the uncontrolled forces of wind and air currents. In the heavier-than-air craft the power of flight is entirely dependent upon engine power applied on aerodynamic principles.

Airships are classed, according to their construction, as non-rigid, semi-rigid, and rigid. The first, the smallest in size, consists of a streamlined balloon with a car, provided with an engine and propeller. This class of airship was put to considerable use by the U.S. navy in the Second Great War. In the semi-rigid class there is a keel between the cars and the gas envelope. This keel distributes the weight of the car. As in the non-rigid type, crew, engines, propellers, etc., are carried in a car incorporated within the keel or suspended below it.

It is in the third class, the rigid airship, that the greatest developments have been seen. An elaborately constructed framework, or hull, curtains the lifting balloons, or gas-bags, and compartments for crew, passengers, engines, ballast, and stores are contained partly within the hull and partly in cars directly attached to the keel and faired into the hull.

On the stern of all airships are stabilising and control surfaces. Without these the airship could not be kept on a given altitude or course, nor would it have directional stability.

Early Airships

The first non-rigid to fly was the French steam-driven Giffard on Sept. 24, 1852. The first to execute a figure-of-eight and land at its starting point was the French Capt. Renard's *La France*, on Aug. 9, 1884. No further progress was possible until the arrival of the internal combustion engine. Santos-Dumont and Zeppelin were the first to use this with success.

Early airships were controlled vertically by ballast and gas valve, later by moving weights. In 1907 Capt. Voayer, of the French army, on the Lebaudy airship *Patrie*, was among the first to use elevating planes.

The net lift of an airship is the difference between the weight of the air it displaces and its own weight plus the weight of its gas. At 30 ins. barometer and 60° F. temperature, 1,000 cubic ft. of both air and hydrogen weigh about 75 lb. and 5 lb. respectively, the lift then being 70 lb. per 1,000 cubic ft. With increasing pressure, the air displaced, if the temperature remains steady, becomes heavier, hence there is a gain in lift. The opposite is true for a falling barometer. As the barometer falls about one inch per 1,000 ft. of rise, the air density is approximately one-thirtieth less, and so about one-thirtieth of the lift is lost for each 1,000-ft. climb if the ballonets are empty or the gas-bags of a rigid are full. Gases also expand and contract in volume roughly 1/500th for each 1° F. rise or fall of temperature. If both air and gas temperatures are the same, the lift will decrease or increase about 1/500th for each 1° F. rise or fall in temperature.

As an airship with empty ballonets or taut gas-bags rises, her volume remains constant, and the expanding gas is valued, i.e. released. As she is ascending into a decreasing density of air, she will lose about one-thirtieth of her lift for every 1,000 ft. With air in her ballonets, or with flabby gas-bags, her lift will remain constant provided air and gas temperatures are the same. Then the gas expands at the same rate as the weight of the displaced air decreases. Lift will be lost only when gas is valued at pressure height.

The gas superheats quicker than the surrounding air. Expansion will then be faster, and more air is displaced. So there is a false lift by the weight of this air, and this also limits the ceiling, though the larger the ballonet the greater the attainable altitude. The aluminium colour of the envelope, and flight at high speed, tend to reduce heating of the gas.

Temperature usually falls with height by some 3° F. per 1,000 ft. This lapse rate partly counteracts the expansion of the gas with height. Purity of the gas affects lift. If the purity be 90 p.c., there is a 10 p.c. loss of lift, for it is assumed that the impurity is air.

Humidity also affects lift, but to a much smaller degree. The less the humidity the greater the lift, and vice versa. Summing up, then, lift is greater on a cold, dry day than on a hot, damp day, and when gas purity is high. Besides static lift, due to their displacement, airships have a dynamic lift, due to movement. Hence large ships of many tons, heavy or light, can be flown.

NON-RIGID AND SEMI-RIGID AIRSHIPS. Non-rigid ships can be built up to sizes of about 650,000 cubic feet. The larger a non-rigid, however, the greater the internal pressure, and the heavier the envelope tends to become in proportion to the gain in lift due to increased volume.

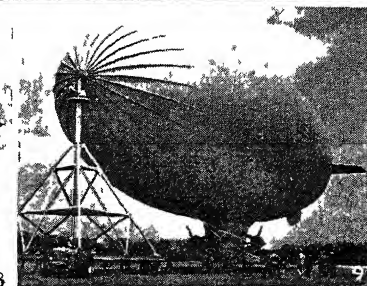
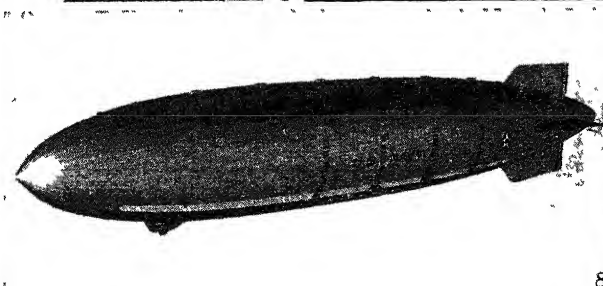
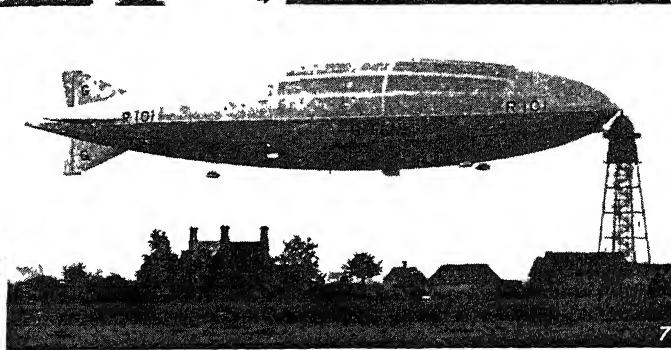
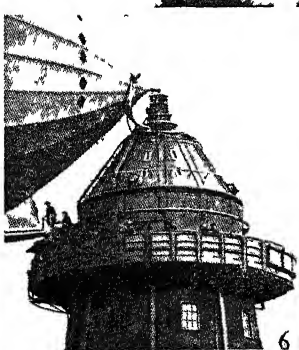
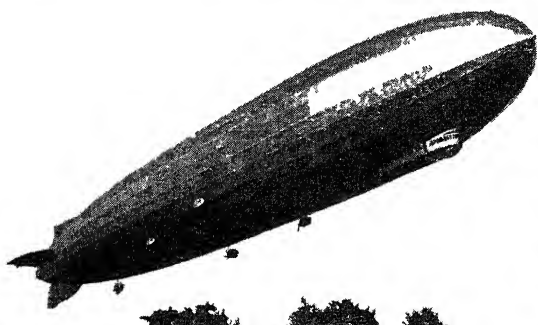
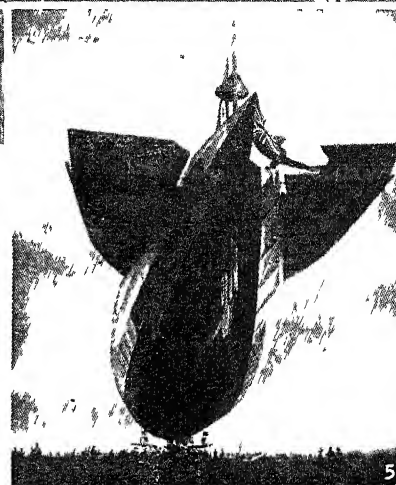
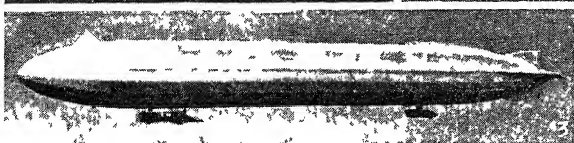
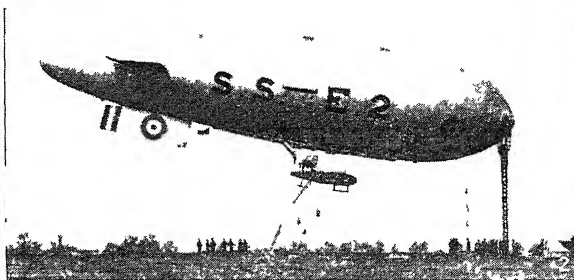
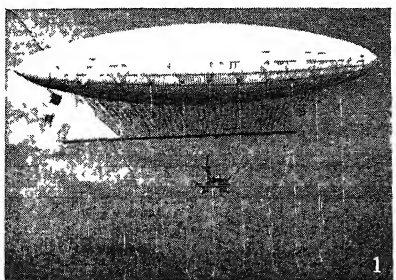
Attempts have been made to overcome this trouble by providing the envelope with a rigid girder as a keel, from which the cars are suspended. The Lebaudy I was the first semi-rigid, making her first flight on Nov. 13, 1902. In 1905 she was bought by the French and became the first army airship in the world. In Italy and Russia this type was successful up to about 800,000 cubic ft. The shape of the envelope still depends upon the maintenance of internal pressure by the ballonets, but lower pressures are possible, and therefore lighter envelopes.

The First Great War

The Allies made great use of non-rigids and semi-rigids throughout the First Great War. France and Italy used them for bombing, but more successfully for naval purposes. Great Britain was the first to demonstrate the value of the non-rigid for anti-submarine operations. British airships flew over 2,245,000 m. during that war. Out of the thousands of convoys escorted by allied airships, only two surface craft were lost to U-boats.

For reasons of economy Britain abandoned non-rigid airships in 1921. France continued with non-rigid and semi-rigid airships up to 1937. Italy abandoned semi-rigid airships in 1928. The U.S.A., however, possessing the advantage of their non-inflammable helium gas and having a long coast line, continued to develop these ships.

RIGID AIRSHIPS. Count F. von Zeppelin (q.v.) was the pioneer of the rigid type of airship. This rigid type has a streamline frame-work hull made up of longitudinal girders and transverse frames or rings. The hull is thus



1. Airship designed and built by Henri Giffard in 1852
2. SSE 2 (1919), a non-rigid airship, at her mooring mast, Pulham, Norfolk. 3. Zeppelin L 9, an early rigid model (1915). 4. Graf Zeppelin arriving at Hanworth on a demonstration flight, Aug, 1931. 5 R34 anchored

on American soil after flying from Scotland, July, 1919. 6. Top of the mooring mast of R101, showing passengers' entrance 7 R101, completed in the autumn of 1929. 8. U.S. airship Akron, lost in a storm in April, 1933. 9. US L type of modern airship, 1939

AIRSHIP : INTERESTING AND FAMOUS TYPES FROM 1852 TO 1939

Photos, 1, model in Science Museum, S Kensington, 2 and 9, courtesy of Lord Ventry, 3, Imperial War Museum

divided into bays, each containing a gas-bag with one or more valves. The whole has a fabric outer cover, leaving a space between it and the gas-bags. Inside the hull is a keel, or keels, to strengthen the ship and provide access to the various parts. The ballast and petrol tanks are concentrated in the keel. The motors are usually in separate engine cars, and a control car is built into the hull. On the stern are the usual control and stabilising planes.

The German rigids performed invaluable services as long-range scouts for their High Seas Fleet from 1914-1918. Between Jan., 1915, and April, 1918, they were used as bombing craft in 51 raids on England and Scotland. As carriers for passengers and goods the Zeppelins were unequalled. LZ1 made her first flight on Aug. 2, 1900, and from then on all the most successful rigid airships have been built upon Zeppelin lines. One or two other types of rigid airships have been produced, notably the German Schutte-Lanz, with wooden framework, and the early British ships. But none ever reached the standard of the Zeppelins.

Triumph and Disaster

It was the British R34, a copy of the German L30 class, which was the first aircraft in the world to fly east to west across the Atlantic and to make the double crossing. This was in July, 1919. Major G. H. Scott was the pilot.

In Aug., 1921, after the disaster to R38, when Air Commodore E. M. Maitland, Britain's greatest airship officer, and many of our finest airship pilots were killed, Great Britain abandoned rigid airships for Service purposes. But in 1924 the air ministry decided to construct two ships of 5,000,000 cubic ft. capacity for imperial communications. These, R100 and R101, carried out their trials during 1929 and 1930. R100, in spite of being over weight, attained a maximum speed of 83 m.p.h., then a record. She flew to Canada and back, under Major G. H. Scott and S/Ldr. R. S. Booth, in June-July, 1930. After the loss of R101 she was sold for scrap.

R101 suffered from serious lack of lift, partly because of the experimental heavy oil engines which weighed much more than was expected. She successfully weathered at a mooring mast a squall of 83 m.p.h., which is a world record. In Oct., 1930, before she had completed her

trials, an attempt was made to fly her to India. On Oct. 5 she was lost at Beauvais, Major Scott and most of the distinguished passengers and crew perishing. She was the last British airship to take the air.

Germany and U.S.A.

Meanwhile, the ban on German airships had been lifted. The first to be built was the Graf Zeppelin, of 3,708,240 cubic ft., driven mostly by Blangas. She was launched Sept., 1928, and was in continuous service until June 18, 1937. She made 148 ocean crossings, nearly all to time-table, and flew round the world, carrying a total of over 13,000 passengers.

The Hindenburg, of 8,720,000 cubic ft., was driven by engines totalling 4,400 h.p. Up to 75 passengers, plus 2 tons of mail, could be carried for 8,000 miles at a cruising speed of 78 m.p.h. This airship was commissioned in March, 1936, and made 37 ocean crossings, all to time-table, before her destruction on May 6, 1937, due to hydrogen catching fire. Thirty-six passengers were killed out of 97. They were the first fare-paying passengers to be killed in an airship. On Sept. 14, 1938, the LZ130, Graf Zeppelin II, an improved Hindenburg, was launched, but she was not heard of after Sept., 1939.

The U.S. navy laid down two new airships in 1928 as scouting units of the U.S. fleet. They were Akron and Macon. Akron (q.t.), launched Sept. 23, 1931, was caught and destroyed in a storm centre over the Atlantic on April 4, 1933, only three of her crew of 76 being saved. Macon, launched April 21, 1933, developed structural troubles. Before she could be laid up for alteration she broke up in the air Feb. 12-13, 1935, losing only two out of her crew of 83. Both ships carried four aeroplanes. At a cruising speed of 40 knots they had a range of 8,000 nautical miles, their max. speed being over 70 knots.

Goodyears later planned a 10,000,000 cubic ft. airship aircraft carrier, to carry 10 fighters and have a maximum speed of 84 knots with a range at 50 knots of 9,000 sea miles. A similar design for civil purposes would carry 100 passengers over 8,000 m. non-stop.

In the meantime the non-rigids were active. Up to Sept. 30, 1941, Goodyears' civil airships had carried 407,171 passengers and flown 4,085,244 m. without mishap to any single passenger.

The U.S. navy had about eight airships in commission in Sept., 1939. By 1945 it had over 150. These airships played a vital part in the campaign against the U-boats in American waters. Four classes were in use, the L and G for training, the operational K class of 416,000 to 425,000 cubic ft., and the M type, of 625,000 cubic ft., maximum speed over 70 m.p.h., which appeared in 1943 with a duration of over 80 hours at cruising speed. The M type ships are the largest successful non-rigids ever built.

Despite the airship's history, airship authorities consider that its story is by no means closed. In the rigid form it provided a greater payload for its horse-power and greater comfort than other forms of aircraft. In the non-rigid form it provides a valuable scouting aircraft at sea in war-time at moderate cost.

Air Sickness. An illness which sometimes develops in a person while flying. There are a number of causes such as incautious eating before or during a flight, lack of oxygen while flying in the higher altitudes, and obstructed vision. The main cause, however, is the unnatural motion which an air passenger has to endure when the aircraft is flying in rough weather or under atmospheric conditions which result in the aircraft pitching suddenly and losing and gaining height with violent movements. When an aircraft is buffeted about the changes in its flying attitude tend to upset the sensory system. The labyrinth of the ear (the inner ear) which senses yawing, pitching, and rolling movements can function only when coordination with the eyes is available and therefore if the air traveller for some reason cannot keep himself orientated by having the horizon in view, the loss of balance becomes greater and this increases any feeling of sickness.

Airspeed. The measurement of the airflow meeting an aircraft when it is in flight is called the airspeed. It has no relation to the speed at which the machine may be flying over the ground. For example, if an aircraft is flying into a 50-m.p.h. wind and the airspeed indicator carried by the machine registers 150 m.p.h., it does not indicate that the speed over the ground is 150 m.p.h. but solely that the pressure of the air which is being encountered is registered at that figure. The ground speed would be 100 m.p.h. Airspeed is shown to the pilot of

an aircraft by an indicator, the A.S.I., which is affected by the static and dynamic pressures of the atmosphere.

Airspeed. British aircraft manufacturers, with works at Portsmouth. Before the outbreak of war in 1939, the Airspeed Co. (associated with de Havillands) had produced several civil aircraft, notably the Courier, first in Britain with a retractable undercarriage, and delivered to the R.A.F. the first Oxford advanced trainer. This small twin-engined monoplane was put to a variety of uses, including training for bombing, night flying, photography, and gunnery, as well as for flying training. In 1946 appeared the Consul, a civil development, and the Ambassador (*q.v.*) was also announced. The Horsa (*q.v.*) was a glider used extensively in the Allied invasion.

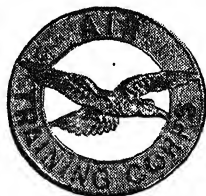
Airstrip. Strip of ground affording landing and take-off facilities for aircraft. It is a temporary or emergency provision for use while a more permanent airfield (*q.v.*) is prepared. In country overgrown with bush, scrub, etc., the strip is cleared by bulldozers and levelled with graders. On a loose surface (*i.e.* in desert country) a portable metal track of strong wire netting is stretched over the strip, pulled taut, and pegged down. The



Air Training Corps. Class of eager cadets examine the guns of an R.A.F. light bomber

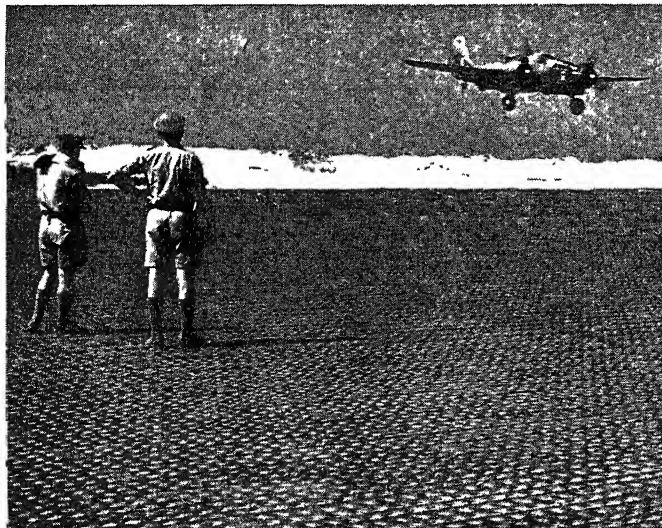
royal warrant dated Feb. 1, 1941. It was established to provide pre-entry training for prospective candidates for air crew and technical duties in the Royal Air Force or the Fleet Air Arm until they reached the call-up age. Enrolment was open to youths who were physically fit and were aged between 15 and 18. The whole organization of the Corps was based on that of the Air

of 1944 close on 140,000 cadets had joined the R.A.F. for both air and ground crew duties. Two-thirds of the candidates for air crew duties in the R.A.F. were members or ex-members of the Air Training Corps. The value of the Corps became apparent as its enrolment grew from year to year and it was fully appreciated by the Air Council and the Training



Badge of the A.T.C.

Commands of the R.A.F. To strengthen the cooperation which existed between the latter and the Corps, in Dec., 1943, Air Marshal Sir E. Leslie Gossage, formerly A.O.C. Balloon Command, became Chief Commandant and Director-General of the Corps, in succession to W. W. Wakefield, who was civilian director for the preceding period. In the wartime A.T.C. there were eleven Commands, including one in London, one in Scotland, one in Wales, and one in Northern Ireland. They were subdivided into Wings, Squadrons, and Flights, organized on a school and local basis, the squadrons and flights being administered, under the Air Ministry, by local committees. In 1946 the A.T.C. was reorganized under the six regional groups of Reserve Command, R.A.F., the appointment of chief commandant and director-general being abolished. *Consult The Story of the Air Training Corps*, ed. L. Taylor, 1946; *Drill Book for the A.T.C.*, 1944.



Airstrip. Transported in 25-yard rolls, strips of metal "netting" laid side by side form an admirable surface for emergency landing-grounds

Royal Navy developed an airstrip for use on water, made of linked and hinged buoyancy cans, hexagonal in shape.

Air Training Corps. Voluntary organization established by

Defence Cadet Corps which preceded it and was sponsored by the Air League of the British Empire in 1938. Before the Air Defence Cadet Corps came under the control of the Air Ministry and was

Air Transport. Before the First Great War there was no organized air transport. In the U.K. pilots were certificated by the Royal Aero Club as the British member of the *Fédération Aéronautique Internationale*, the authority controlling sporting flying. During that war civil aviation was prohibited (as it again was during the Second Great War, except under special licence from the secretary of state for Air). Because of the swift development of flying during the First Great War, completely new regulations were required after its end. Civil aviation in the U.K. was subsequently controlled by the Air Navigation Acts, 1911 and 1919, under which the air navigation directions were first published on April 30, 1919; and on May 1, 1919, civil flying in the U.K. officially began, with pilots licensed by the Air Ministry.

Control of civil aviation in the U.K. was vested in the secretary of state for Air from 1919 until the appointment of a minister of Civil Aviation in Oct., 1944, and the creation of a ministry of Civil Aviation in 1945. The Air Registration board, instituted 1937, undertook duties in respect of design, construction, and maintenance of civil aircraft. An Air Transport licensing authority was set up in 1938 to administer the system of licensing air transport organizations within the U.K.

In 1924 Imperial Airways Ltd. was formed by the amalgamation of Daimler Airways, Handley Page Transport, Instone Air Line, and British Marine Air Navigation Co. Ltd. Two earlier concerns, Air Travel & Transport Ltd. and Air Post of Banks Ltd., had ceased to operate. Imperial Airways became the sole instrument for British overseas air services until the formation of the independent British Airways in 1936. In 1939 British Overseas Airways Corporation (*q.v.*) was formed by the enforced amalgamation of Imperial Airways and British Airways into a government-owned corporation.

Railway and Shipping Companies

Air transport offers the maximum advantage over long-distance land routes and on overseas routes of any length. On short land routes the speed of air travel may not do much more than recover the time lost in getting to and from the terminal airports, which are usually sited on the fringes of the larger cities. But whenever air transport begins to save time, it competes with railway and ship-

ping interests; it is therefore natural that railway and shipping companies have sought greater interest in air transport.

During the Second Great War all internal airways in Great Britain, with the exception of Allied Airways (Gandar Dower) Ltd., were run by the "railway group," whose activities were controlled by the Associated Airways joint committee. On Feb. 23, 1944, the Cunard-White Star, the Bibby Line, and Thomas Brocklebank shipping companies were given authority to run air lines and maintain aircraft and hangars.

On Aug. 1, 1946, two further state airways corporations were formed: British European Airways, to operate all scheduled air lines within the U.K. and from the U.K. to the Continent; and British South American Airways, for the specialised routes to S. America. These were to be financed wholly out of public funds, their governing boards to be appointed by the minister of Civil Aviation. In 1949 B.S.A.A. was merged with B.O.A.C., so that all British regular air lines were in the hands of two corporations only. Private companies were permitted under the Civil Aviation Act, 1946, to carry out charter or other non-scheduled operations, and some eventually ran short air lines in association with B.E.A. Since 1949 certain civil cos. have run scheduled services in the U.K.

In the U.S.A.

Control of civil aviation in the U.S.A. is the joint responsibility of the Civil Aeronautics board and the Civil Aeronautics administration section of the department of Commerce. Early in 1942 air transport was replanned and zoned, and companies operated in subservience to the Air Transport Command of the U.S. army under their own management and with their own personnel, much as British shipping operated in the war. Pan-American Airways' pre-war monopoly of overseas services was broken by the introduction of a New York-Foynes (Eire) route flown by American Export Airlines, which also operated to Bermuda and Puerto Rico for the U.S. navy.

In July, 1945, the U.S. civil aeronautics board authorised three companies to operate U.S. world air routes for seven years, *viz.* Pan-American World Airways, to India *via* the British Isles and Cairo, and to Rome *via* Portugal; American Overseas Airlines, to Scandinavia and possibly Moscow;

Trans-World Airline to Cairo *via* Eire. American terminals are at Boston, Chicago, Detroit, New York, Philadelphia, and Washington.

Most nations at one time or other have placed their external airways operations in the hands of a monopolistic organization, *e.g.* British B.O.A.C., Pan-American Airways, Air France, German Lufthansa, Dutch K.L.M. When two nations became concerned in associated air services there were usually either reciprocal rights or the formation of a joint organization such as the former Deruluft (German-Russian Air Traffic Co.), or Hamiata, which represents a Sino-Soviet air line.

Tasman Empire Airways Ltd. was a good example of collaborative air transport. With head offices in Wellington, N.Z., it operated a mail and passenger service between Auckland and Sydney and had a tripartite capital subscription, with N.Z. National Airways holding 39 p.c. for N.Z., British Overseas Airways Corporation 38 p.c. for the U.K., and Qantas Empire Airways Ltd. 23 p.c. for Australia. In 1942 Pan-American Airways extended its San Francisco-Auckland service to Sydney. Disagreements over the Pacific service were solved when war conditions brought about a unilateral service.

After the war the International Civil Aviation Organization (I.C.A.O.) was set up to regularise such matters between governments and to arrange international safety measures (*e.g.* the weather ships stationed in the Atlantic).

In the summer of 1919 representatives of British, Dutch, Swedish, Norwegian, and Danish air transport companies met at The Hague to discuss mutual problems, a German company being coopted at the desire of the former neutrals. From this meeting emerged the International Air Traffic Association, a body which regularised problems peculiar to the working of air traffic companies. Subsequently the Air Transport Association of America was formed with similar objects within the western hemisphere. On April 16, 1945, air transport operators from 17 U.S. air lines and 20 air lines from other countries met in Havana and accepted draft articles for a world International Air Transport Association. See Air Law; Air Line; Airways; Atlantic Ferry; Atlantic Flights; Aviation, Civil.

Air Transport Auxiliary. An organization set up in the first month of the Second Great War for the purpose of delivering by air new aircraft to the Royal Air Force after they had left the factories in Britain. The pilots and ground personnel at first were all civilians, most of the former having been private flyers before the war. A proportion of these were men who were either too old for service in the R.A.F. or who were unable to reach the medical standards required by the service. In 1940 a Women's Ferry Pool was introduced, under the leadership of Miss Pauline Gower, an experienced pilot of the between-wars period. Foreign pilots were enrolled also and a number of American airmen came to Britain to take up the important work of ferrying aircraft to R.A.F. stations in all parts of the country and, later in the war, to the Middle East, Malta, and subsequently to and from the United States. Air Transport Auxiliary, which was formed by Gerard d'Erlanger, operated under the control of the Ministry of Aircraft Production. When the need for more pilots grew as the production of aircraft continued to expand it became necessary to second a number from the R.A.F. This transfer of service pilots to this civilian organization was the more urgent when the U.S.A. entered the war and the American ferry pilots were required by the U.S. Air Forces. All the pilots on entering the Air Transport Auxiliary underwent a course of instruction and the training was so thorough that ultimately women pilots who formerly had flown only light aircraft were able to ferry the fastest fighters. By Oct., 1942, these women were piloting every type of military machine, including four-engined bombers.

Air Vice-Marshal. Title of an officer of the Royal Air Force which was introduced in the service in Aug., 1919, to replace the titles of rear-admiral (if the officer had held such rank in the Royal Naval Air Service) or major-general, equivalent rank in the Royal Flying Corps and the Army. An air vice-marshal is the immediate senior in rank to an air commodore. When service dress uniform is worn this rank is signified by a broad braid ring surmounted by a narrow braid ring on the sleeves of the tunic and on the shoulder straps of the greatcoat. The equivalent rank in the W.R.A.F. is Air Chief Commandant.

AIR WARFARE FROM 1914 TO 1945

Captain Norman Macmillan, M.C., A.F.C.

Telling how the nations, particularly Great Britain, developed, organized, and deployed the air weapon. As an account of the strategic use of Air Power, this article is corollary to the one given under that heading. Tactics are explained under Air Fighting. See also Air Defence; Air Raids; Luftwaffe; Royal Air Force, etc.

Air warfare can be said to have begun in 1914 when reconnaissance by aeroplanes of the Royal Flying Corps was largely responsible for the successful retreat of the B.E.F. from Mons. Although fighting between aircraft began in an elementary fashion before the end of 1914, air warfare during the First Great War was regarded primarily from the aspects of reconnaissance and direction of artillery fire.

The main object of fighter aircraft was then to clear the sky for the activities of artillery observation (now called bombardment control) and reconnaissance aircraft; this was accomplished partly by the provision of fighter escorts, but mostly by dispatching fighter patrols to wage constant war upon enemy fighters.

Early Formations

It appears to have been Lord Kitchener who first foresaw the need for aircraft to fly in formation for war purposes. In Nov., 1914, he gave orders to the Directorate of Military Aeronautics that flying in formation was to be practised. Before the end of 1916 flights flew in formation, and in 1918 large formations of several squadrons were seen in France.

Night-flying aeroplanes were introduced early in the First Great War under the compelling influence of the Zeppelin raids, and night bombers were used by the R.F.C. in France from the winter of 1916-17 onwards. No blind-flying instruments were then invented; all night-flying aircraft flew singly, and only when weather permitted some visual observation of the nocturnal landscape.

Day bombers operated in formations. Their radius of attack (about 120 miles) exceeded that of contemporaneous fighters, which were unable to escort the bombers all the way to and from their targets. Fighters first carried bombs (four 20-pounders) in the summer of 1918.

Throughout the First Great War aircraft were seldom able to make a major contribution to the fire-power volume of the surface forces, and the total weight of bombs dropped by the British air forces during the whole of the

1914-18 war (7,945 tons) was less than that dropped by the Allied air forces in Europe in a single day during the closing stages of the Second Great War with Germany.

One exception certainly occurred in the Palestine campaign, when the air forces under Allenby wrought havoc among the retreating Turkish troops at Megiddo.

Naval aircraft were concerned mostly with anti-submarine patrols and reconnaissance over the North Sea to keep watch over movements of German surface warships and submarines. Some naval squadrons cooperated with the B.E.F. Others undertook small-scale strategic bombing attacks. A few ships were sunk by airborne torpedoes.

The German air forces were used in a similar manner, but the geographical situation enabled them to attack London (and other towns) with naval and army Zeppelins and aeroplanes. Berlin was never bombed during the First Great War, but at the armistice a special squadron was at readiness to bomb the German capital, using Handley Page V/1500 four-engined bombers.

Most aeroplanes flew in the First Great War without radio, but artillery observation aircraft used W/T. Before the war ended, operational flying at about 20,000 ft. had become possible, and oxygen equipment and electrically heated clothing were available. Static line parachutes were used by observers in kite balloons, but there were no parachutes for aircraft crews.

Between the Wars

During the interval between the First and Second Great Wars the technical progress of air warfare outstripped the operational. Aircraft developed greater range and load-carrying capacity, faster speed, greater fire-power, higher ceiling; blind-flying instruments, parachutes, better bomb-sights and gun-sights were produced; bombs became larger; aircraft were more reliable; radio telephone communication between aircraft and aircraft, and air and ground came into use; the monoplane displaced the biplane. Staff control over operations

was improved. Aircraft were directed from operations rooms which became the "brains" of air warfare. Radar was added to the other means of intelligence used to counter enemy action. Functional R.A.F. Commands (Bomber, Fighter, Coastal) replaced the mixed brigades of the First Great War and the subsequent peace-time organization of Air Defence of Great Britain, Inland Area and Coastal Area. In 1938 the Fleet Air Arm was restored to the complete control of the Admiralty.

When the Second Great War began the greatest technical and operational advances had been made in the command dealing with fighter defence. This is understandable, for its procedure was a direct development of First Great War fighter strategy and tactics, and this could not be said of the work of the other commands to an equivalent degree. To that happy circumstance must be attributed part of the success of Fighter Command over the Luftwaffe in the Battle of Britain.

Tactical Air Force

The tactical air force was evolved during the military operations of the British 8th army in North Africa. It was the underlying principle of that successful campaign that the air battle must be won first. When air supremacy was established, the unfettered air force could be used to disorganize the enemy surface forces. The tactical air force was commanded by specialist air officers. Army and air staffs worked to a common plan under one sole commander-in-chief.

The same principle was followed after General Eisenhower became supreme commander of the Allied armies in N. Africa. It was maintained during the crossing of the Mediterranean *via* Sicily, and during the invasion of Italy. It was elaborated in the later stages of the Second Great War in Europe because larger forces were committed after the invasion of Normandy, and several tactical air forces were engaged, over whom there was no over-all air commander. Instead, a senior air officer became deputy supreme commander.

The strength relationship was never so exactly planned in any previous campaign. The nearest example may have been in the combined strokes of the Wehrmacht and Luftwaffe in the battles of 1939-41.

During the course of the Second Great War, R.A.F. squadron personnel and aircraft became fully mobile while station (and other ground) personnel remained relatively static. This use of mobile tactical squadrons supported by static ground echelons enabled the various functional commands to overlap their operations within the same geographical zones as conditions demanded without interfering with efficiency.

To ensure mobility of tactical units airfield servicing commandos were organized; these advanced with the leading elements of the army to select and prepare airfield sites into which air squadrons could move to maintain close support for the infantry and armour.

Transport aircraft were used to bring up petrol and other supplies. Airfield defence became important, leading to the formation of the R.A.F. Regiment, with both Field and A.A. Squadrons.

During the attack on the Rhine, 2nd T.A.F. squadrons operated from airfields in Holland, Belgium, France, and the U.K. The U.S.A. 9th A.F. had previously moved from the U.K. to the Continent in support of the American armies. So had the Army air observation post squadrons, which in the Second Great War conducted the battery shoots that had been directed in the First Great War by R.F.C. and R.A.F. Army Co-operation squadrons. Among the mobile components of air warfare the Glider Pilot Regiment was concerned with special surface operations whenever an additional weight of attack was necessary to assist the army to break through difficult territory, or to contain an enemy force; its pilots were partly Army and partly R.A.F. personnel, while its tug aircraft were flown by an R.A.F. group. The Special Air Service was an extension of this process into the realm of infiltration of small parties from overhead far behind the enemy lines. Transport Command was ubiquitous, flying wherever its carrying capacity was required.

Other Air Commands

Fighter Command, Coastal Command, R.A.F. Bomber Command, and the U.S.A. 8th A.F. maintained fixed headquarters in the U.K. throughout the war.

Fighter Command aircraft undertook offensive sweeps over the Continent and the seas around the U.K. to combat enemy aircraft by

day and night. Coastal Command swept the oceans and sea-lanes in continuous anti-U-boat warfare. Convoys were further protected when at sea by ship-borne aircraft carried in merchant ships and warships fitted with catapults, and in aircraft carriers of the Fleet, Escort, and Merchant ship types. All marine air operations by British aircraft, whether shore-based or ship-borne, together with the naval operations of the Fleet Air Arm, came under the operational control of the British Admiralty. In the Western Hemisphere U.S. Naval Air Corps and R.C.A.F. aircraft collaborated under the U.S.N. and R.C.N. The S.A.A.F. operated from its own territory.

Bomber Command and the U.S.A. 8th A.F. were the two great strategic air commands of the Second Great War in Europe, but the smaller and important U.S.A. 15th A.F. based in North Africa and later in Italy must not be forgotten. These air forces were primarily responsible for conducting strategic war against German industry, oil, and communications. In the Far East the U.S. 20th and 21st A.F. maintained a similar campaign against Japanese industry. The work of all strategic air forces was greatly indebted to the photographic reconnaissance units that secured target evidence.

Softening Up

Aircraft were employed to "soften up" enemy surface positions before Allied ground attack forces went in. Road and railway bridges across rivers were brought down so that the enemy forces within any selected area became isolated and difficult to reinforce. Railway trains and road convoys were sought by day and night and destroyed or damaged by "interdiction" aircraft detailed to interrupt the enemy supply programme. River, canal, and coastal waterborne traffic was cut by both tactical and strategic aircraft, the latter using bombs up to 22,000 lb. for this purpose. Where necessary, "choke-points" were created by the demolition of buildings (or even towns) that would obstruct road and rail junctions, sometimes by day bombers and sometimes by night bombers. In these duties both tactical and strategic operations were interwoven by the deputy supreme commander controlling the air components.

The immense speed-up in air warfare demanded improvements

in communications. Air staffs used landline telephones, teleprinters, W/T and R/T radio, radar, dispatch riders, and within local stations, necessarily widely dispersed against bombing, loud-speaker linkage. Ground communication with aircraft, normally effected by controllers using R/T, was carried into the forward army zone by army and air force personnel in mobile vehicles equipped with R/T and called Visual Control Posts. Thence aircraft flying over advanced army elements were directed on to targets which required immediate attention from overhead fire-power.

In the Far East, during the last nine months of the war, Superfortress bombers in fleets up to 800, dropped record loads of 6,000 tons, though operating under conditions involving turn-round flights of about 3,000 m. There too, the U.S. Third Fleet, which included British warships and aircraft carriers, dwarfed all previous marine

air efforts by more than once deploying 1,250 aircraft over Japan in a single day's strike, in the proportion of about four U.S. aircraft to one British.

Many operations in air warfare, particularly strategic bombing, must affect the citizens of a nation. Three-dimensional warfare acknowledges no boundary between military and civilian property or personnel within its target area. When strategic bombing is used as a weapon of blockade civilian life and property cannot be immune from its destructive effect. It is therefore clear that this development in war more than any other brought into being the national condition known as total war.

The discovery of the means to employ atomic energy in bombs (see Atomic Bomb) created a situation unprecedented in the world's history, and this development in air warfare opened an epoch which can lead to total peace, with total destruction as the alternative.

same time barred such development to Germany, Italy and, by the misfortune of war, to France.

The post-war era therefore began with the transoceanic airways almost exclusively in the hands of U.S. and British interests, with the U.S. preponderating in the Pacific and to a lesser extent in the South Atlantic, but with Britain similarly well situated in the North Atlantic zone.

More Powerful Aircraft

The improvements in aero-engines (*q.v.*) resulting from unlimited war expenditure between 1939 and 1945 made possible the construction of much larger transoceanic aircraft. In 1939 the largest of these aircraft (the Boeing Clipper) weighed 37½ tons. In 1943 the weight had risen to 70 tons (the Martin Mars), and in the same year new designs were in hand for aircraft weighing up to the 111½-ton Bristol 167. In the same period engine power rose from units varying between 1,000 and 1,500 h.p. to units producing from 2,200 to 3,500 h.p.

Advances in the power produced by engines at great heights and the introduction of pressurised cabins made it possible to operate at more economical atmospheric levels without this causing any discomfort to passengers.

In 1939 not more than nine passengers per flight could normally be transported across the Atlantic at a cruising speed of about 190 m.p.h. The Bristol 167 design current before the Second Great War ended made provision for a load of 72 passengers to be carried over the same route at a speed 60 m.p.h. faster.

INTERCONTINENTAL AIRWAYS.

These fly between the different units of the eastern and western hemisphere land masses, but do not connect the two hemispheres. In the western hemisphere air routes link North and South America, traversing the isthmus and islands of Central America on the way. On these routes it is possible to travel from Nome in Alaska to Santiago in Chile, from Montreal in Canada to Buenos Aires in Argentina. The western and eastern routes follow their own seaboard, in two fluctuatingly parallel lines, inter-connecting all the principal cities of the western hemisphere between the Arctic and Antarctic oceans by their direct and transverse connecting lines. The trunk lines are mainly owned by the U.S.A.

Aircraft of shorter range than those in the transoceanic group

AIRWAYS OF THE WORLD

Captain Norman Macmillan, M.C., A.F.C.

A survey of the four main kinds of air route and the varying problems involved in their organization and maintenance. See also under Air Law; Air Transport; Aviation, Civil. See plates showing World and European Airways

Airways of the world may be classified in four main groups: (1) transoceanic; (2) intercontinental; (3) continental; (4) national. Each group calls for differences in aircraft, servicing organization, and personnel. Each group may differ from any other group in respect of the legal codes under which it must operate and to which it must conform; these considerations are dealt with under Air Law. Here the routing and technical organization of the airways of the world are described.

TRANSOCEANIC AIRWAYS. These are routed to interconnect continental land masses separated by water, with their terminal points sited to give rapid connexion between the great centres of government, finance, and industry (and therefore population). They cannot be regarded wholly from a commercial aspect, but must be considered in varying degree as of politico-strategic and politico-economic importance. They are, without exception, government-controlled, whether operated by state air lines or by chosen instruments of a public or private financial structure. In each case transoceanic air routing is a matter for intergovernmental

arrangement between the terminal states concerned.

The land masses of Western Europe and North America have produced the principal seafaring peoples since the introduction of mechanical propulsion to ships, and it is the states of the same land areas who have pioneered the transoceanic airways.

Atlantic and Pacific

Transoceanic airways span the Atlantic and Pacific Oceans to interconnect Europe, Africa, Asia, and Australasia with North and South America, and include the Tasman Sea crossing. Before the Second Great War the U.S.A. operated trans-Atlantic and trans-Pacific airways and Great Britain operated experimental trans-Atlantic airways. But the earliest of all transoceanic airways were the French-pioneered routes across the South Atlantic between French West Africa and Brazil, a route whereon Germany operated at a later date, and in which Italy was accumulating a growing interest. Russia experimentally pioneered a trans-Arctic route from Moscow to San Francisco. The Second Great War gave great impetus to Anglo-American development of all oceanic airways, and at the

are suitable for use in intercontinental flights, and the conditions of service make it possible to increase the number of intermediate passengers and goods, with a correspondingly lower percentage of through travellers.

Politico-Strategic Problem

In the eastern hemisphere intercontinental airways connect Europe, Africa, Asia, and Australasia. They include over-water crossings up to some 500 m. in length. The British, French, Dutch, Belgians, Italians, Germans, Russians, Australians, and Japanese were all operators of airways in this group before the Second Great War. The U.S. entered it during the Second Great War, and expressed her intention of remaining in it. Owing to the politico-strategic importance of many of the airways in this group victorious Powers may impose conditions for the operation of these airways with which vanquished Powers will be forced to comply. Within this group of airways should come the greatest technical developments, for all types of long-haul and short-haul heavy and medium commercial aircraft will be employed, and these airways will have the strategic military importance possessed by railways since the middle of the Victorian era, particularly in regard to the siting and ownership of aerodromes.

CONTINENTAL AIRWAYS. These are of two classes: those which, although continental in character, as in the U.S.A., Russia, and Australia, are yet national, and those which are truly continental, as in Europe. The difference is mainly brought about by the complications in the second class of multiplied languages, customs clearances, currency rates of exchange, restrictions upon the carriage by foreign aircraft of nationals within their own states, and variations in juridical conditions, all of which exist in their greatest aggregate within Europe. It has been therefore necessary to create conventions to which the numerous states can subscribe, so that differences can be smoothed out into something like a semblance of uniformity. (See Air Law.) In America, Russia, or Australia, continental airways can be legitimatised on a federal basis. Similar advantages apply within states of lesser areas only when airways are restricted to a national basis. This difference must, in varying degree, affect the relative

development of airways by competitive nations.

Continental airways, like railways, are almost exclusively concerned with the linking of the principal cities within a particular zone of the earth's land surface. They are generally flown by medium-range aircraft, carrying from 14 to 40 passengers at speeds of 200 to 300 m.p.h. on a basis of fair frequency of service.

Control of Routing

Airways in this group are more crowded than those so far considered, and it is therefore essential that strict measures of flying control be maintained over the routing, height of flight, and approach to airport of the aircraft engaged on the services.

Abyssinia and the Union of South Africa have the status of sovereign Powers in regard to air routes and services within their territory. Nevertheless, because much African administration is the colonial prerogative of a number of European states, special international problems arise in regard to the operation of airways in Africa, e.g. the *a priori* claim of the U.S.A. to continue the flying rights in Africa granted to her during the Second Great War.

NATIONAL AIRWAYS. These can be organized with the greatest freedom, e.g. internal airways were quickly organized within the Weimar republic of Germany in 1918-19. Such airways are free from customs difficulties and language problems. They operate under one law, and passengers require no passports. States like the U.S.A. and U.S.S.R., with great aggregates of territory and population, possess the geographical conditions wherein the maximum benefit can be obtained from national airways. But excessive concentration upon internal airways excludes a state from some of the benefits of international air traffic. Thus, in the interrelationship of national and international airways, states are faced with an air traffic problem similar to the commercial problem of free trade v. tariff reform, and the further development of the airways of the world must depend upon the manner in which this problem is resolved.

Airy, Sir George Biddell (1801-92). British astronomer. Born at Alnwick, Northumberland, July 27, 1801, and educated at Cambridge, where he was senior wrangler in 1823, he became a fellow of Trinity and Plumian

professor of astronomy. In 1825 he was appointed director of the astronomical observatory at Cambridge.



Sir George B. Airy,
British astronomer

In 1835 he became Astronomer Royal. His practical abilities found scope in his device for the telegraphic distribution of exact time. One of his most important achievements was the establishment of a mechanical device, whereby the disturbance of the compass in iron-built vessels could be rectified. He resigned in 1881, and died Jan. 2, 1892.

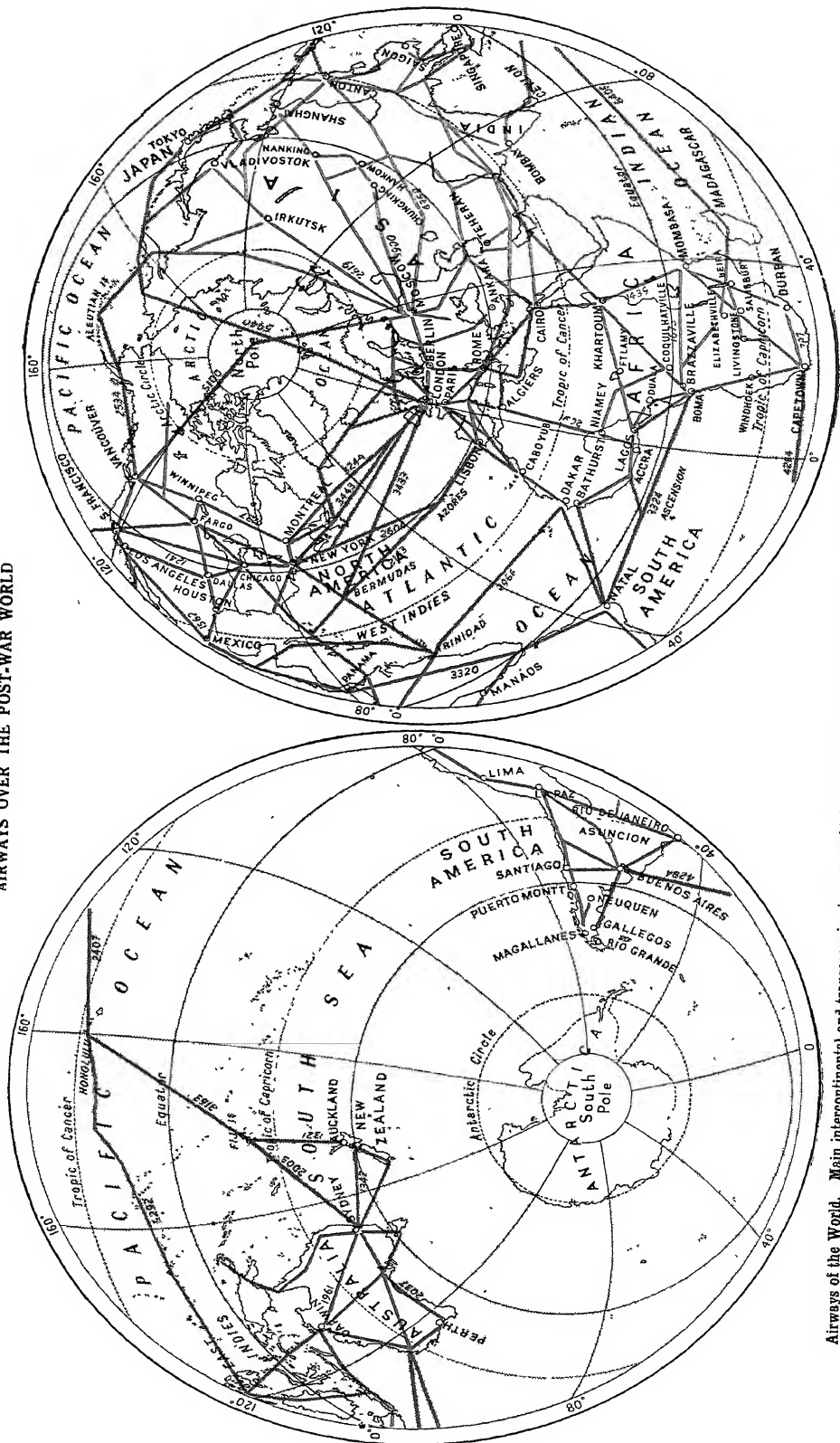
Aislabe, John (1670-1742). English politician. Born at York late in 1670, he became member of parliament for Ripon in right of his possession of the Studley Royal estates. He was treasurer of the navy in 1714 and chancellor of the exchequer under Sunderland in 1718. He strongly supported the scheme to pay off the national debt which became known as the South Sea Bubble (*q.v.*). On its collapse he resigned office early in 1721 and, being found guilty of "most notorious, dangerous, and infamous corruption," was committed to the Tower. After being released, he retired to his Yorkshire estates, the motion for confiscation of these having been rescinded.

Aisle (Lat. *ala*, wing). Portion of a church extending on one or both sides of the choir or nave, from which it is divided by columns and arches. The transepts of large churches, such as York Minster, are furnished with aisles. The Roman basilica of the larger type was divided by columns into nave and aisles, and has served as a model for Christian churches. *Pron. ilc.*

Aisne. River of France. Rising in the Meuse department, it flows W. and joins the Oise near Compiègne. Connected with the Meuse and Marne by canals, it is navigable for rather more than half its length of 175 m.

Aisne. Frontier department of N.E. France. Watered by the Aisne, Oise, and Marne, with other navigable rivers and canals, its area is 2,866 sq.m. Generally level, except to the S., the soil is fertile, producing sugar beet and wheat, with potatoes, flax, hops, and hemp: cider and wine are made, and chemical, sugar, and other industries are carried on. The capital is Laon, and Soissons is one of the chief towns. Pop. 484,647.

AIRWAYS OVER THE POST-WAR WORLD



Airways of the World. Main intercontinental and transoceanic air routes which will be used in post-war aviation. The distances between the air stations are given in statute miles
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AISNE : THE BATTLES OF 1914-18

Major battles of both the First and the Second Great Wars are described in detail in this Encyclopedia (see Julland; Somme; Ypres, etc.). This article deals with the three Aisne battles of Sept., 1914; April-May, 1917; May-June, 1918

The first battle of the Aisne was fought on a front running E.S.E. for 100 miles from Compiègne to Tahure, E. of Reims, between four German armies and four French armies together with Sir John French's British army. Both sides had just fought the battle of the Marne; and as the Germans had been driven back 40 m. on the W. section of their front, there was reasonable hope that they might be forced to make a much more extensive retreat. But the Germans, while marching S., had begun entrenchments on the plateau between Soissons and Craonne, N. of the Aisne. When they fell back from the Marne, these were hastily pressed forward, peasants and prisoners being compelled to work on them, so that a great fortified system was created. Moreover, the Germans had crushing superiority in heavy artillery and a great advantage in machine-guns. Numerical superiority in aircraft was less important because of uniformly bad weather.

The First Battle

The Allies reached the Aisne at the W. end of their line on Sept. 12. Reims was reoccupied the following day, when the river was crossed at many points. But for the most part the Allies could make no further progress, being confronted by heavy machine-gun and artillery fire from the enemy's strong positions. By Sept. 14 they realized that the Germans intended to make a stand. Troops of the 6th French army had pushed forward

during the night and had come near the crest of the plateau, but could make no further headway. On Sept. 15 the British 1st corps gained a local success in a rapid advance towards the plateau and the Chemin des Dames, the great road that runs along its summit, and reached a point close to Troyon. It was known later that they had confronted a gap in the German line, but the 15,000 tired men were too few to press home the advantage. Yet they obtained a firm footing on the upland, and inflicted heavy losses. Though German reinforcements, counter-attacking, stopped further progress, the line gained by the British was held thereafter for the next three years without marked change.

German counter-attacks continued during the following days, and the Allies were slowly forced back from positions they had gained. Sept. 17 saw the beginning of a French attempt to turn the German right flank, an attempt that was unsuccessful because the Germans extended their flank as fast as it was threatened. The British 1st corps beat back a considerable counter-attack, and in following up managed to cross the Chemin des Dames, reaching Cerny, N. of Troyon. But this proved to be the high-water mark of the Allied advance, for Cerny could not be held.

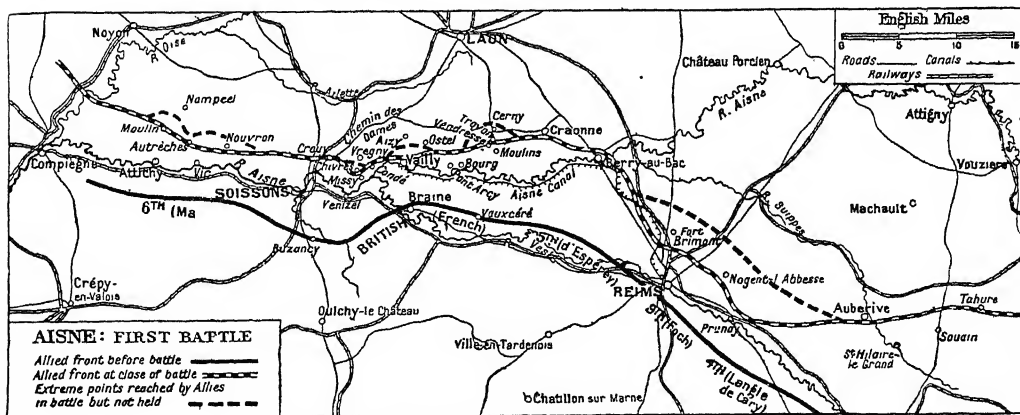
The French 9th army N. of Reims was next counter-attacked. The Germans recaptured a height near Reims which gave them good

observation of that city, which they immediately began to bombard. Positions dominating Reims remained in German hands for four years. Germans attacked again at intervals at various points during Sept. 19 and 20, but with no effect. The battle had now degenerated into trench warfare, with both armies under cover and no possibility of further decisive movement. The failure of a determined German effort a week later (Sept. 27-28) to capture the British position near Troyon virtually marked the end of the battle.

The result was a disappointment to the Allies. British losses were over 13,500, more than one-fifth of the total force engaged: French and German casualties were on the same scale. But the Germans were left firmly entrenched across the very heart of France. Their Aisne positions remained intact almost to the end of the war.

The Second Battle

When the second battle of the Aisne opened in April, 1917, the situation had been slightly changed: first by a German local success in 1915 which had given the German army a narrow strip on the S. bank from Missy to Chavonne, then by the Allied gain of ground N. and E. of Soissons during the German retreat in early 1917, which carried the Allied front to near Laffaux and Vregny, and left a sharp German salient projecting south. The German positions were by this time extraordinarily strong, the trenches being provided with deep concrete dug-outs, while machine-gun posts of steel and reinforced concrete were everywhere. Numerous limestone caves



Aisne. Plan of the positions of the Allied forces during the first battle

Aisne from time to time, the whole of the heights of the Chemin des Dames was in French hands by the beginning of Nov., 1917. They were lost again in the third battle of the Aisne, May 27–June 18, 1918.

The Third Battle

The Germans' Aisne offensive of 1918 followed their two offensives towards Amiens and the Channel ports in March and April respectively. They were in high spirits at their successes, and Hindenburg had publicly declared that the war was over and won. British reserves from Great Britain totalling 350,000, and the 200,000 American troops embarked for Europe, were not yet available in the field, so that everything depended on the capacity of the battered Allied armies already in France to hold off the Germans until these reinforcements could be thrown in.

The strategic position of the Germans enabled them to mass their own reserves in the centre of a semi-circle near Cambrai, while the Allies had to move their troops on exterior lines. On the Aisne front the Germans had two armies ready to attack, with a total of 28 divisions of specially trained troops for the first onslaught and 13 divisions in reserve. They were disposed between Anizy-le-Château and Reims, on a front of over 30 m. The Allied force facing them consisted, on the left, of two French divisions in the line, holding the Chemin des Dames as far E. as Craonne, and two in reserve; three British divisions (50th, 8th, 21st) in the line from Craonne to Berméricourt, with another (25th) in reserve; on the right, the 5th French army, holding the positions round Reims—a total of only eight divisions and one army to confront 41 divisions.

The Germans opened a terrific bombardment of the front at 1 a.m. on May 27, and their infantry attacked two hours later. The four French divisions were quickly forced back from the Chemin des

Dames by sheer weight, the Allied centre was broken, and the Germans streamed through to the Aisne, which they crossed at Vailly and other points. By dusk troops of their right had also crossed the river Vesle, W. of Fismes, after an advance of over 10 m. unparalleled in their previous offensives. Eastward from Craonne, the British 50th division offered stout resistance and did not fall back until its left flank was uncovered by the retreat of the French. The 21st, from Cormicy to Berméricourt, stubbornly held its position, though all touch with headquarters was lost for 24 hours. By evening the British front ran from near Fismes, through Cormicy, to Berméricourt.

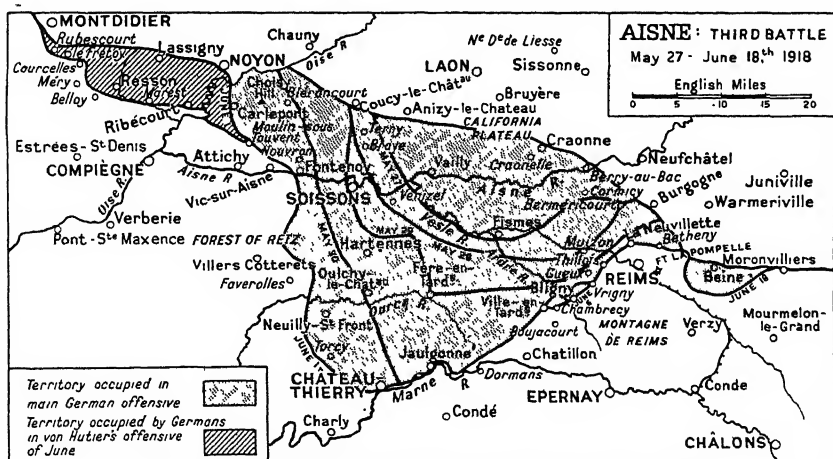
On May 28 the German attacks were renewed by fresh divisions, and their salient was widened and deepened in the direction of Paris. The French were forced back from Terny, Braye, and Venizel, and Soissons was shelled with terrible effect. In the centre the Germans reached a line midway between the Aisne and the Marne. In the E. the British had to continue their retreat to maintain contact with the French, and were driven back across the Vesle towards the Ardre valley. Soissons fell on May 29, when the German advance was extended southwards towards the Marne, reaching Fère-en-Tardenois, only 8 m. from that river. The British were pushed from their positions near Reims as far as La Neuville, under 2½ m. from the city. Reims was bombarded and the troops there were in danger of envelopment.

The Marne was reached on May 30, at Jaulgonne and to the

immediate E., and the Germans gained important ground N.W. and S.W. of Soissons which enabled them to use the rly. junction there, thus gaining increased power of manoeuvre. On the Marne they commanded and rendered useless the main rly. from Paris to Épernay and Reims. They also reached Betheny, 1½ m. N.E. of Reims, though failing in an effort to carry further the threat of encirclement. On May 31 they strove to extend W. in the direction of Paris, gaining a position on the heights N. of Château-Thierry.

At this point, just as decisive victory seemed within the German grasp, the violence of the attack suddenly died away. Though the Germans made further small gains, they did not add greatly to their total capture of 50,000 prisoners and 650 guns. French reserves were arriving in strength and resistance was stiffening. On June 1, Fort la Pompelle, 5 m. S.E. of Reims, was both lost and regained by the French, and on the N.W. part of the battle-front a hill near Noyon changed hands four times, ultimately resting with the French. On June 2 a great German assault W. of Reims was shattered by the French; and British divisions holding positions E. of Ville-en-Tardenois, from Aubilly to Boujancourt, earned high praise from the French command by beating off all attacks. German troops penetrating the outskirts of Château-Thierry were also thrown back.

On June 3 the Germans, attempting to advance along the N. bank of the Ourcq and to work into the forest of Villers Cotterets,



Aisne. Map of territory occupied by the Germans in the third battle

encountered American troops, who speedily proved their quality by counter-attacking at Veully-la-Poterie and driving back the Germans in confusion. American and French troops also drove back a German battalion that had crossed the Marne at Jaulgonne. Americans attacked again on June 5 and 6 near Torcy, N.W. of Château-Thierry, and in conjunction with the French, drove the Germans back a mile. The Germans stormed Bligny in the morning of June 6, but the ruins were recovered by the British in the evening.

The failure of the Germans' efforts to widen their flanks brought their offensive to a close. It had secured greater results than their two earlier 1918 offensives, having carried their front to a point only 40 m. from Paris. They had made immense captures. But their primary aim, which was to inflict decisive defeat on the French army, had not been attained; and their own losses in the offensive reached 150,000. The Allied losses, though serious, could be replaced from the American army, such an inexhaustible source as the Germans could not draw upon.

The Aisne was finally cleared of Germans during the last great Allied offensive in early Oct., 1918.

Aissé, MADemoiselle (c. 1694-1733). Circassian letter-writer. The daughter of a chief whose home was pillaged while she was a child, she was sold to the Comte de Ferriol, French ambassador at Constantinople, who sent her to the household of his sister-in-law at Paris. There her history and beauty combined to win her great popularity, and Philip, duke of Orleans, courted her openly. She gave life-long affection, however, to the Chevalier d'Aydie, by whom she had a daughter. In her letters to Madame Calandrini are some shrewd portraits of people of the period. Aissé died March 13, 1733, and her letters were edited by Voltaire in 1787. Her name is a corruption of Haïdée, and her story probably suggested to Dumas the character of that name in *The Count of Monte Cristo*.

Aistulf or **ASTOLF** (d. 756). King of the Lombards. He succeeded his brother Rachis in 748; in 750 Ravenna was in his hands and he marched on Rome. The pope, failing to obtain help from the emperor Constantine V, appealed in person to the Frank mayor of the palace, Pippin, or Pepin, whom he anointed king

of the Franks. In 753 Pippin defeated Aistulf and made him promise to give up the captured territory. Aistulf broke this promise and besieged Rome. Pippin again defeated him, and Ravenna and part of the exarchate passed from the Lombards to the popes.

Aitchison, CRAIGIE MASON ATTCHISON, LORD (1882-1941). Scottish judge. He was born Jan. 26, 1882, and educated at Falkirk High School and Edinburgh University, winning the Murhead prize in civil law. Called to the Bar in 1907, he became a K.C. in 1923. One of his successes as counsel was obtaining in 1929 the annulment of the verdict of murder against Oscar Slater (*q.v.*), passed 20 years earlier. Having entered Parliament in the same year as Labour member for Kilmarnock Burghs, he became lord advocate for Scotland, and continued to hold that office when the National Government was formed in 1931, until in 1933 he became Lord Justice Clerk. He served on the Scottish educational committee of the Privy Council. He died at Edinburgh, May 2, 1941.

Aitken, ROBERT GRANT (b. 1864). American astronomer. Born in California, Dec. 31, 1864, he studied astronomy at Williams College, Massachusetts, became a professor at the College of the Pacific, and in 1895 went as assistant to Lick Observatory, of which he became director, 1930-1935. His outstanding work was the discovery of over 3,000 double stars and the calculation of their orbits and those of many comets. He was awarded the gold medal of the Royal Astronomical Society in 1932.

Aiton, WILLIAM (1731-93). British botanist. Born in Lanarkshire and brought up as a gardener, he was appointed assistant at the Botanic Garden at Chelsea and in 1759 to the management of that at Kew. He remained there for the rest of his life, also looking after the royal pleasure gardens at Richmond, and died Feb. 2, 1793. Aiton spent sixteen years on his *Hortus Kewensis*, a catalogue of the plants at Kew, the variety of which he had done much to increase; this was published in 1789. His eldest son, William Townsend Aiton (1766-1849), succeeded to the posts at Kew and Richmond and carried out work for George IV at Windsor and Brighton. He brought out a second edition of the catalogue

and helped to found the Royal Horticultural Society.

Aitutaki or **AILUTAKI**. One of the Cook Islands, in the Pacific Ocean. Discovered by Captain Cook in 1777, it is 9 m. long and 21 m. in circumference. With a few islets, all surrounded by a coral reef, the whole encloses a lagoon, which was once surveyed for the purpose of making a naval station. Coconut palms abound.

Aix. French islet off the coast of the department of Charente-Inférieure. Two miles from land, it is 3½ m. long by 1½ m. wide.

Aix. City of France, known as Aix-en-Provence. It is in the department of Bouches-du-Rhône, 18 m. by rly. N. of Marseilles. The seat of an archbishop, the cathedral dates from the 11th century. The university, founded in 1409, is now incorporated with that of Marseilles. The city has a large library, technical colleges, schools, museums, law courts, a 17th century town hall, and natural fountains. It trades in oil, wine, flour, and almonds. The ancient *Aquae Sextiae* (Springs of Sextius), Aix grew up round warm mineral springs where were baths built by the Roman consul Sextius Calvinus in 123 B.C. It was the former capital of Provence, and was famous in the days of King René (1409-80). The Marquis d'Argens (*q.v.*), the philosophical writer, was born at Aix, and Mirabeau was its deputy at the time of the Revolution. Pop. 46,053.

Aix-la-Chapelle (Ger. Aachen). French and more familiar name of a German city close to the frontiers of Holland and Belgium, 45 m. by rly. W. of Cologne. The large central rly. station was familiar to European travellers as a frontier station. For over a thousand years the city was a centre of West European culture and learning. In modern times it became a manufacturing centre. In the Second Great War its strategic position and its proximity to the Siegfried Line made it an important centre of war industry, and its capture by the U.S. 1st army in Oct., 1944, represented the first major Allied success on German soil. The city was largely destroyed in the process.

Before the Second Great War its two most notable buildings were the cathedral and the town hall. The former was built by Charlemagne A.D. 796-804, on the site of an earlier church, and was added to in 983 by Otto III. Parts of this old building remain, but the choir and chapels date from the 14th and 15th centuries. Some marble

and granite columns which were brought from Italy, and the bronze west doors, are almost the only other remains of the time of Charlemagne. The great emperor was buried here, the cathedral in reality being the chapel of his adjacent palace, and his grave is marked by a stone slab bearing the words Carlo Magno. With other relics his bones are preserved in a magnificent reliquary in the cathedral treasury (they were hidden in a copper mine at Siegen during the war). The building also contains his marble chair, long used as the coronation seat, a pulpit presented by the emperor Henry II, and a candelabrum, the gift of Frederick I (Barbarossa) in 1168. The cathedral was damaged by Allied shell-fire in 1944, but not irreparably. The town hall, on the other hand, was completely wrecked. It contained the Kaisersaal or coronation hall of the German emperors, decorated with modern frescoes. It occupied the site of Charlemagne's palace, and dated from the 14th century. Its two fine old towers were restored after a fire in 1883. The old city had also the Grashaus, used for the archives, two of its old gates, and many venerable churches, including that of S. Foillan. The sites of the former city walls are occupied by promenades.

Around the old town, with the fishmarket, the market square, and the cathedral square, lay the newer town, with suburbs, both residential and industrial, stretching away

for some distance. A little to the E. are the springs, and adjacent were the Kurhaus and Kursaal, for which the city was long famous. Valuable paintings were housed in the Suermondt Museum.

Aix-la-Chapelle owes its origin to its springs, which were known to the Romans, who called it Aquisgranum. In the 8th century Charlemagne's father, Pepin, made his residence here, and Charlemagne raised the place, of which he was very fond, to a position of importance. It became, and remained for 700 years, the coronation place of the German kings, most of whom passed some of their time here. Frederick I and Frederick II were among its chief benefactors. It was a free city, but after the coronation of Ferdinand I in 1531, the last to be held here, its importance began to decline.



Aix-la-Chapelle. Air view of the relatively undamaged cathedral taken after the capture of the city in October, 1944. Top right, coronation seat of Charlemagne

It suffered during the Thirty Years War and through fires. In 1801 it became part of France, but in 1815 was handed over to Prussia.

Aix owed its modern prosperity to the opening up of a big coalfield, while its direct rly. communication with Cologne, Brussels, Antwerp, and Liège was another commercial advantage. Its manufactures included cloth and other textiles, iron goods of various kinds, chemicals, and beer. It was also a centre for banking, insurance, and general trading. Sufferers from rheumatism and other complaints derived great benefit from the sulphur and chalybeate baths. Pop. (pre-war) 165,710.

In the Second Great War

From Aix in 1914 the Kaiser's armies advanced to invade the West, and for a time it was the Kaiser's headquarters. Again in 1940 it was made the spring-board of invasion. Industrial targets in Aix-la-Chapelle were repeatedly bombed by British and American planes, 1942-43. Then during the storming of the first line of the Siegfried defences in Sept., 1944, the city became one of the main objectives of the U.S. 1st army. By Oct. 8 the city was encircled, the Americans capturing "Crucifix Hill," a height of 800 ft., to the N.E. of the city. The same day Gen. Hodges's troops closed all but 4 m. of the German escape gap N. of the city, the gap itself being covered by U.S. artillery. The Germans repeatedly attacked Crucifix Hill, and bitter hand-to-hand fighting resulted. The Americans broke into the S.E. suburbs, and, after capturing the district of Haaren, cut the Aix-Cologne highway. On Oct. 10 the U.S. commander issued an ultimatum calling upon the German commander and the burgomaster to surrender the city unconditionally within 24 hours. No reply was received, and the citizens, whose numbers had dwindled to about 15,000, were then "bomarded" by 12,000 leaflets fired from U.S. guns, urging the people to stop the useless destruction and bloodshed.

Meanwhile German forces attacked desperately in an attempt to open the escape gap but without success, and on Oct. 12 Aix was dive-bombed by hundreds of U.S. fighter-bombers. House-to-house fighting reduced many districts to ruins, and the Americans, having tightened the ring round the city, continued to advance through the industrial suburbs, until on Oct. 19 half the city was in their hands.

After a battle in the streets that had lasted seven days, Aix-la-Chapelle finally fell to the U.S. forces on Oct. 20, the last German strongpoint having been overcome. Over 10,000 prisoners were taken during the fighting, and some 3,000 civilians were already assembled in American camps W. of the city. Thousands sheltered in cellars during the violent bombardment.

Aix-la-Chapelle, TREATIES OF. These are three in number:

1. The treaty which, on May 2, 1668, put an end to the short War of Devolution between France and Spain. It was forced on France by the action of the triple alliance of Holland, England, and Sweden; by it France restored Franche Comté to Spain, but retained the conquests made in 1667, consisting of several Flemish towns.

2. A treaty signed on Oct. 18, 1748, and added to on Oct. 5, 1750, which ended the War of the Austrian Succession between Britain, Austria, and Holland on one side and France, Prussia, and Spain on the other. By the peace Frederick of Prussia retained Silesia, and Britain secured the recognition of the Protestant succession and the confirmation of the Asiento contract, i.e. the right to send yearly a vessel to the Spanish colonies for slaves. All conquests were restored, including Cape Breton Island to France and Madras to England. The Empress Maria Theresa and her husband, Francis of Lorraine, were recognized as rulers of the Empire, and changes were made in the map of Italy.

3. In Oct., 1818, Great Britain, Austria, Russia, and Prussia sent representatives to a congress at Aix-la-Chapelle, the duke of Wellington and Lord Castlereagh being the British members. The main object of the meeting was to decide on the policy to be adopted towards France, then occupied by the allied armies. It was decided that France should be evacuated, and the four Powers renewed the alliance which they had originally made to overthrow Napoleon. The members then discussed various other matters, including some differences between Sweden and Denmark and between Spain and her colonists in South America. No practical results followed, but the Congress is interesting because it attempted to settle the affairs of Europe by discussion rather than force.

Aix-les-Bains. Town of S.E. France, in the department of Savoie. A favourite watering-place, it is 8 m. by rly. N. of Cham-

béry, on the Paris-Turin line, and 823 ft. above sea level. Its warm springs are beneficial to sufferers from rheumatism and gout, the waters being used for both baths and drinking. As *Aquae Gratianae*, it was known to the Romans, ruins of whose temples, baths, and triumphal arch remains. The Germans reached Aix-les-Bains June 24, 1940, withdrawing later until they occupied Vichy France in Nov., 1942. The town was liberated by the F.F.I. Aug. 26, 1944.

Aiyar, SIR SHESHADRI (1845-1901). Indian statesman, Born at Palghat, in the Malabar district of Madras, he was educated at the presidency college of Madras. After experience under the British administration, he became in 1883 diwan (premier) of Mysore after its return to native rule. He was knighted in 1893.

Ajaccio. The capital of Corsica. Situated on the W. coast, on the N. shore of the Gulf of Ajaccio, it is connected by rly. with Calvi and Bastia and by steamship with Marseilles and Nice. The seat of a bishop since the 7th century, it has a cathedral, colleges, lib-

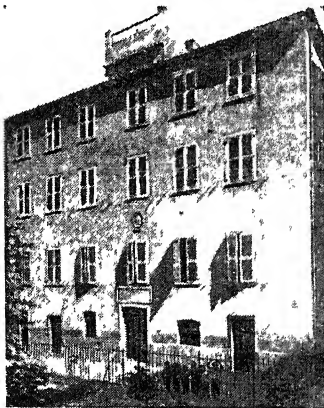
rary, museum, the house in which Napoleon I was born, and a large harbour protected by a citadel. It has a wireless station, and exports wood, wine, oil, grain, sardines, anchovies, coral, hides, and chestnuts. Its mild, clear climate makes it a favourite winter resort. Under the Vichy govt., June, 1940, to Nov. 11, 1942, when Italy occupied Corsica, Ajaccio was liberated between Sept. 10 and 17, 1943, by its citizens, and French troops landed here from the night of Sept. 13-14. Pop. 31,434.

Ajaigarh. Former small state in Bundelkhand, Central India, 130 m. S.W. of Allahabad. It is now part of the Vindhya union. The state received its name from its 9th century hill fortress, with ruined Jain temples. Its area is 788 sq. m.

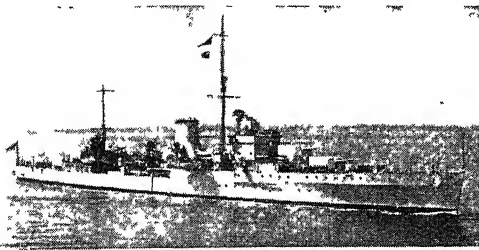
Ajalon OR AJALON. Town and valley of Dan (Josh. 10). Identified with Yalo, N. of Jerusalem, the locality is memorable for the defeat of the Canaanites by the Israelites, when the sun and moon stood still at the word of Joshua "until the people had avenged themselves upon their enemies."

Ajanta OR ADJUNTA. Village and ravine in Hyderabad, India. The ravine is celebrated for its Buddhist cave temples, dating from 200 B.C. to A.D. 600, and decorated with frescoes. See Paintings in the Buddhist Cave Temples of Ajanta, J. Griffiths, 1896-7.

Ajax. In Greek legend, the name of two heroes who fought for the Greeks in the Trojan War. One was distinguished as the son of Telamon, the other as the son of Oileus. Next to Achilles, the former was accounted the mightiest warrior in the Greek host. A single combat between him and Hector, the Trojan champion, ended in the two combatants

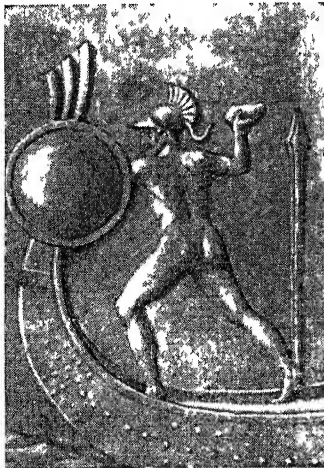


Ajaccio. General view of the town, which lies on the north shore of the Gulf of Ajaccio. Above, house in which Napoleon I was born



H.M.S. Ajax. British cruiser which took part in several important naval engagements during the Second Great War, including the Battle of the River Plate

exchanging arms as a token of mutual respect. After the death of Achilles the two claimants for the dead hero's armour were Ajax and Odysseus, and, when the armour was awarded to the latter, Ajax,



Ajax defending his ships
Enlarged from an engraving on an ancient gem

in a fit of frenzy, slaughtered a flock of sheep, supposing them to be his enemies, and killed himself.

Ajax, the son of Oileus, though small of stature, was fleet of foot and a skilful fighter. Because of his profanation of the temple of Athena at the fall of Troy, the offended goddess caused a storm to destroy the ship of Oileus on his homeward journey. Ajax took refuge on a rock, and impiously boasted that he was safe in spite of all the gods. This offended Poseidon, who shattered the rock with his trident, and Ajax was drowned.

Ajax, H.M.S. British cruiser of 6,985 tons, carrying eight 6-in. guns. Under the command of Capt. C. H. L. Woodhouse, and flying the flag of Commodore Henry Harwood, she, with H.M.S. Exeter and H.M.S. Achilles, attacked the German raider Admiral

garrison on Santorin I., N. of Crete, surrendered to her. See N.V.

Ajax Powder. Safety blasting explosive, which is permitted for use in the United Kingdom. It has the following composition: nitroglycerine, 22.5 p.c.; potassium perchlorate, 37.2 p.c.; collodion cotton, 0.8 p.c.; wood-meal, 11 p.c.; dinitrotoluene, 3.5 p.c.; ammonium oxalate, 25 p.c. The mixture is prepared by gelatinising the nitroglycerine with the collodion cotton and incorporating the jelly with the powdered remainder in a mixer of the type employed for cordite or blasting gelatine. The dinitrotoluene lowers the freezing point of the nitroglycerine, while the ammonium oxalate reduces the temperature of the explosion flame. A more recently introduced low freezing type of explosive of this class, Polar Ajax, is permitted for use in coal mines. It contains nitroglycerine-dinitroglycol 24-26 p.c.; ammonium nitrate 44-47 p.c.; nitro-cotton 0.25-1.25 p.c.; nitro-toluenes 1-3 p.c.; sodium chloride 23-25 p.c.; wood-meal 0.5-1.5 p.c.; and moisture. It is obtainable in sheathed form.

Ajmer. Capital of the former British province of Ajmer-Merwara (v.i.), India. In a picturesque



Akbar the Great. Pencil sketch of the great empire builder by one of the painters attached to his court
From Laurence Binyon's *Court Painters of the Grand Moguls*

Graf Spee off the Uruguayan coast on Dec. 13, 1939—a naval engagement fully described under the heading *Plate*, *Battle of River*. On March 28, 1941, she took part in the naval battle of Cape Matapan (q.v.), and on Oct. 18, 1944, the German

valley, 228 m. by rly. W.S.W. of Agra, it stands at the foot of Tara-garh Hill, the fort on which was built by Akbar. It has a surrounding wall, with five gates, and contains the remains of a beautiful Jain temple, converted into a mosque, and the tomb of the 13th century Moslem saint Kwaja. Ajmer has railway workshops, exports cotton, salt, and opium, and specialises in dyeing. Pop. 147,528.

Ajmer-Merwara. Small prov. of India. Comprising three subdivisions, it forms an enclave among states of Rajasthan, and is directly administered by the Indian government. The area is 2,400 sq. m.; highest alt. is 2,855 ft. The chief products are maize, millet, oil seeds, cotton, and wheat. Pop. 583,693.

Ajowan. Small, ribbed fruits of an Indian umbelliferous plant, *Ptychotis ajowan*. Cultivated in the prov. of Bengal, they are much like the so-called caraway seeds, aromatic, with a thyme-like odour. Besides being used in cookery, they are employed in medicine as a carminative.



Ajowan, Indian aromatic and medicinal herb

Ajusco. Range of mountains, of volcanic origin, in Mexico, forming part of the S. wall of the central plateau. They rise to a height of 13,000 ft.

Akaba. Gulf, N.E. arm of Red Sea, and town of same name on the E. side, in Transjordan. The Elath of the Bible (Deut. 2), the town is now Transjordan's outlet to the sea. Early in 1949 a British force was sent to garrison the town under the terms of the Anglo-Transjordan treaty of 1948.

Akalkot. Former native state of India, 250 m. S.E. of Bombay city. It was absorbed into Bombay prov. in 1948.

Akashi. Town and seaside resort of Japan. In Honshu Island, it is some 20 m. S.W. of Kobe, on the Inland Sea. Japanese time is regulated from Akashi. Pop. 38,956.

Akassa. Town of Nigeria. It is an important depot, with engineering works and repairing shops, at the mouth of the Nun channel of the Niger delta. Pop. 35,000.

Akbar, called THE GREAT (1542-1605). Mogul emperor. Jhalal-ed-din M o h a m m e d, surnamed Akbar, and the greatest of the

Mogul emperors in India, was born in Oct., 1542. His reign coincided almost exactly with that of Queen Elizabeth, beginning in 1556 and ending in 1605. His grandfather Babar, part Mughal or Mongol, whence the name Mogul, and part Turk, had invaded Northern India from Afghanistan, and founded the Mogul empire of Hindustan. His father, Humayun, had been expelled, but again invaded India and recovered, without completely establishing, his dominion in 1555. Next year his lieutenant Barram completed the conquest, on Humayun's death, on behalf of the fourteen-year-old boy who was to be known as Akbar. In 1560 Akbar by a *coup d'état* seized the reins of government.

Akbar's sway extended over the Punjab and the Ganges basin as far as Bihar, and before his death had covered the whole of India N. of the Vindhya hills. He conquered because expansion was forced upon him, not from greed of territory. The bulk of his subjects were Hindus, but among them or over them the Mahomedans, of Afghan or Turkish origin, held the predominant position. After their defeat and submission the Hindu princes were restored to a position between vassal and ally.

Akbar, in brief, aimed at creating in India a united and consolidated empire, wherein no man should have good grounds for complaining of injustice to himself, his race, or his creed. He reorganized the government, apportioning his realm to chosen lieutenants. The whole land was brought under a systematic assessment, forming a lasting basis for a reasonable taxation, which provided an ample revenue. Akbar's officers were chosen from Hindus and Mahomedans alike; his great finance minister, Todar Mahl, was a Hindu, and Rajput princes commanded his armies. All were free to practise their religion; the Hindus were relieved from the taxes which had been imposed upon them as Hindus by all the Mahomedan lords of India. Brahmani pundits, Mussulman mullahs, and Jesuit missionaries held debate in the presence of the Great Mogul. In war Akbar was no mean general, while his personal feats of daring and endurance could be matched by few. To his friends he was royally trustful and generous, to his enemies splendidly magnanimous. He was the true founder and creator of the Mogul Empire, which during its great days was perhaps the most

splendid that the world has ever known. Akbar died at Agra Oct. 15, 1605. See Akbar, G. B. Mallison, 1903; Akbar, the Great Mogul, Vincent A. Smith, 1917; Akbar, Laurence Binyon, 1932.

Akee. Fruit of a W. African tree (*Blighia sapida*) introduced into S. America and the W. Indies. The tree grows to a height of 30 ft. and has compound leaves and sprays of white flowers. The fleshy fruit is three-sided, red tinged with yellow, and about 3 ins. long. When ripe it splits down each side, disclosing a white spongy substance (aril) in which three shining black seeds are embedded. The aril is the portion eaten, and has a pleasant sub-acid flavour.

Akeman Street. Early English name for a Romanised road which, leaving the Fosse Way at Cirencester, skirted the northern Thames valley by Alchester, crossed the Icknield Way at Tring, and joined Watling Street at St. Albans. It was an alternative to the Silchester road from Bath to London.

à Kempis, THOMAS (c. 1379-1471). Augustinian monk and devotional writer. His family name was Hammerken, and he was born at Kempen, near Düsseldorf, of peasant parents. At the age of twelve he began to attend a school at Deventer, Holland, conducted by the Brothers of the Common Life (*q.v.*). The founder of the school, the saintly Gerhard Groot (*q.v.*), was one of his boyhood heroes. Always seeking solitude and preferring only the company of books, he went about 1400 to the Augustinian monastery of Mont S. Agnes, near Zwolle, where his brother was prior. Here in 1406 or 1407 he became a monk, and here the whole of his life was spent. From time to time he held office in the community, but the greater part of his time was occupied in writing chronicles of his monastery, biographies, books of devotion, hymns, and sermons, and copying MSS. He made a complete copy of the Bible in addition to copying missals and also books of hours. His numerous writings on the monastic life include *The Solitary Life*, *The Life of the Good Monk*, *The Discipline of the Cloister*, and *The Soul's Soliloquy*.

His fame rests on *The Imitation of Christ*, first published anonymously in 1418, completed in 1424, and since that date translated more widely than any volume except the Bible. At the end of the 19th century over 3,000 editions of the *Imitation* had been

issued. Written in Latin and divided into four parts, its original purpose was a closer following of the counsels of perfection by those vowed to the religious life. The strength of its extensive appeal lies in the author's knowledge and experience of the unchanging needs of the human heart and the simple sincerity of his writing.

The earliest printed copy of the *Imitation* was published at Augsburg in 1471 or 1472, and the first English translation was printed in 1502. Of the many later English translations mention may be made of John Wesley's, 1735; Challoner's, 1737; and Payne's, 1763. New editions and translations are of frequent occurrence. The authorship has been disputed, and since the 17th century claims have been made on behalf of John Gerson, chancellor of the University of Paris, and of J. Gersen, a Benedictine monk of whom little is known. But the evidence is entirely in favour of Thomas à Kempis. See Thomas à Kempis, S. Kettlewell, 1882; Thomas à Kempis, F. R. Cruise, 1887; and *Story of the Imitatio Christi*, L. A. Wheatley, 1891.

Akenside, MARK (1721-70). British poet and physician. Born at Newcastle-on-Tyne, Nov. 9, 1721, and intended for the Non-conformist ministry, he turned from theology to medicine, studying first at Edinburgh and then at Leyden, where he graduated in 1744. Returning to England in that year, he published *The Pleasures of Imagination*, a didactic poem in blank verse, which won immediate recognition. For a time he practised as a physician at Northampton and at Hampstead, but achieved little success until his friend Jeremiah Dyson established him in Blooms-



Mark Akenside

bury Square and made him an allowance of £300 a year. Having been made fellow of the College of Physicians, in 1754, and principal physician at St. Thomas's Hospital, in 1759, he practically abandoned literature. He died in London June 23, 1770.

Akenside is perhaps less remembered for his blank verse poems than for his appearance in Smollett's *Peregrine Pickle* as the physician who provides a banquet in the style of the ancient Romans. He deserves to live, however, as the author of the pungent satiric

couplets of An Epistle to Curio. *Consult* Poems, ed. with Life, A. Dyce, 1854; Poetical Works with Memoir, C. Cowden Clark, 1840.

Akershus. Variant spelling of the Norwegian county and town of Aggershus (*q.v.*).

Akhal Tekke. Oasis of the Ashkhabad district of Turkmen S.S.R. It is peopled by Tekke Turcomans.

Akhetaton. City of ancient Egypt, on E. bank of the Nile. It was founded about 1369 B.C. by Akhnaton (*q.v.*) when he withdrew his court and capital from ancestral Thebes to a site at Tell el-Amarna. He named the new city Akhetaton, meaning "horizon of Aton" (the sun god).

Akhetaton is the only example showing how a great city was laid out in the time of the Egyptian empire. The ruins show clearly, as nowhere else, the plans of its palaces, temples, houses, and villas, and a village of four-roomed houses for workmen. The better-class houses had their bathrooms with drains. The many noblemen's estates made it rather like a garden city on the edge of the desert. Here were found the famous Tell el-Amarna letters. *See* Tell el-Amarna.

Ak-Hissar. Town of Asiatic Turkey. It is the Greek Thyatira, and the Turkish name means white castle. On the Soma-Manissa rly., 52 m. N.E. of Izmir, it exports marble, cotton, dyes, opium, and wool. It was an old town when the Greeks recaptured it in 290 B.C., and one of the Seven Churches of Asia was here. Pop. 18,026.

Akhlat, KHILAT OR ARDISH. Town of Turkish Armenia. It stands on the N.W. shore of Lake Van, and was the ancient capital of Armenia. Pop. 4,000.

Akhmin. Variant spelling of the name of the Egyptian town known also as Ekhnmin and Ahmin. *See* Ekhnmin.

Akhnaton, IKHNATON OR KHUENATON. Egyptian king of the XVIIIth dynasty, about 1375 B.C. Son of Amenhotep III and his half-Syrian queen Tyi, he began his reign as Amenhotep IV. He abandoned Ammon worship for that of the solar disk, Aton, and changed his name and capital accordingly (*see* Akhetaton). This monotheistic reform was brief, hardly surviving Akhnaton's death, c. 1358 B.C. *Consult* Life and Times of Akhnaton, A. Weigall, 1933.

Akhtyrka. Town of the Ukraine S.S.R., about 65 m.

N.W. of Kharkov. In a fertile fruit-growing district, it trades in agricultural produce and manufactures woodwork, pottery, and sheepskin coats. Pop. 25,750.

During the Second Great War Akhtyrka was one of several towns engulfed in the heavy fighting that raged throughout this sector of the Ukrainian front when the Germans thrust towards Kharkov at the end of Oct., 1941. The town was recaptured by Soviet forces on Aug. 11, 1943.

Akita. Seaport of Japan, on the W. coast of Honshu. The capital of the prefecture of Akita, it trades in rice and manufactures silk and cotton cloth. Pop. 34,500.

Akka. Turkish name for the ancient Syrian city known as Acre (*q.v.*), or in full, St. Jean d'Acre.

Akka. Tribe of pygmy forest-hunters in the Belgian Congo. They were found by Schweinfurth in 1870 in the Aruwimi forests between the Congo and the Albert Nyanza. Their Niam-Niam neighbours call them Tiki-Tiki. Descended from the dwarf negroid race depicted on early Egyptian monuments and traceable in palaeolithic Europe, their ape-like characters—snout-like jaw, top-heavy head, long arms, and weak, inturned feet—betray an arrested human development. Their beehive grass huts, poisoned arrows and iron weapons evince cultural contact with negro peoples. Measured individuals vary from 3 ft. 4 in. to 4 ft. 10 in. in height.

Akkad. Ancient Mesopotamian city. The Accad of Gen. 10, it is identified with the pre-Semitic Agade, the capital of Sargon I (c. 2800 B.C.). Its ruins, which were unearthed between 1917 and 1919, reveal it as a



Akhnaton. Heretical king of Egypt, who instituted worship of the sun
Berlin Museum

garden city, stretching for 20 m. along the left bank of the Tigris *See* Samarra.

Akkerman. Fortified town of Ukraine S.S.R. On the Dneister estuary, near the Black Sea, and 30 m. S. of Odessa, it exports wine, salt, fish, tallow, and wool. A Russo-Turkish treaty was concluded here in 1826. Pop. 33,495.



Akka. Primitive pygmy people of the Aruwimi forests in Central Africa

Akkerman was occupied by Soviet troops after Russia's ultimatum to Rumania in June, 1940, demanding the return of Bessarabia. When Rumania joined Germany in attacking Bessarabia, the Russians evacuated the town. They returned three years later, when, in Aug., 1944, the Soviet 3rd Ukrainian army, crossing the Dniester, broke through powerful defences along the Bessarabian frontier and cut the Akkerman-Bolgrad rly. By Aug. 23, on which date the Russo-Rumanian armistice was announced, Akkerman was again in Russian hands.

Alma Dag. Variant spelling of the mt. range in Asia Minor known also as Alma-Dagh and less commonly as Elma-Dagh. *See* Alma-Dagh.

Akmolinsk. A town and region of Kazakh S.S.R. Situated N.E. of the Aral Sea, 280 m. S.W. of Omsk, on the Ishim, the town was founded in 1862, and is an important traffic centre. Pop. 10,000.

Akola. Tn. and former dist. of Berar, India. Assigned by the Nizam of Hyderabad to the British in 1853-61, the district has an area of 4,110 sq. m. and produces wheat, cotton, aniseed, opium, tobacco, and some indigo. The town, divided by the river

Morna, is 363 m. by rly. N.E. of Bombay, on the Great Indian Peninsula rly. It was the headquarters of the commissionerhip of W. Berar and is a cotton centre. Pop. of town. 62,564.

Akron. Capital of Summit co., Ohio, U.S.A. It is on the Ohio Canal, 36 m. S.S.E. of Cleveland. The seat of a university, its manufactures include rubber, flour, woollens, and machinery, and coal is mined near. The canal and also the Little Cuyahoga river supply water power. Pop. 244,791.

Akron. U.S. naval dirigible airship, constructed at Akron, Ohio, in 1931. She was 785 ft. long, had eight engines giving a total of 4,480 h.p. and a maximum speed of 83 m.p.h., her gas volume of 6,500,000 cub. ft. being nearly twice that of the Graf Zeppelin. Helium non-inflammable gas was employed as in other U.S.A. airships. She was the world's largest airship at that time. She was commanded by Lt.-Commander F. C. McCord with Lt.-Commander H. V. Wiley as executive officer. On April 4, 1933, on a flight from Lakehurst she ran into a hurricane and crashed into the sea. Lt.-Commander Wiley and two men were the only survivors of 77 officers and men. She cost about £1,075,000.

Aksehir or **WHITE CITY.** The Philomelion of the Greeks, it is in the vilayet of Konieh, Turkey, 5 m. S. of the salt lake of the same name. It manufactures carpets.

Aksu (Turkish, white water). Name of several rivers of Asia. The chief, rising in the Pamirs, becomes a tributary of the Murghab.

Aksum. Variant spelling of Axum, or Axumis, a town of the Abyssinian prov. of Tigré. See Axum.

Akyab. Island, district, and seaport of Arakan, Burma. The port, on the E. side of the island, at the mouth of the Kaladan, developed since 1826 from a small fishing village to an important commercial town. It has several public buildings, the principal being the court house, the custom house, a high school, and a hospital. It has a number of large rice mills, and, in addition to rice, exports oil and timber. Pop. 36,569. During the Second Great War the island and port were bombed by the Japanese on May 3, 1942, during the latter's drive westwards across Burma from Rangoon and Mandalay. On May 8 the enemy occupied Akyab, the last Burmese port in British hands. It then became the chief Japanese

base in Arakan and was a target for a series of raids by Allied bombers operating from India. The small island was also the objective of two unsuccessful counter-offensives by the Allies, and from its airfield the Japanese launched raids on Calcutta in 1942 and 1943. On Dec. 31, 1944, three Indian Air Force pilots of a tactical reconnaissance squadron made one of their routine low-level inspections of the island. They saw derelict defences, evidence that the Japanese had evacuated Akyab; and on Jan. 4, 1945, British commando and Indian troops landed, and advanced inland from the coast, having reoccupied the town and port.

The district of Akyab, a level tract between the Arakan Yoma Mts. and the Bay of Bengal, covers an area of 5,136 sq. m. It is watered by the Kaladan, Mayu, and Lemru rivers, which form a network of channels in their lower courses and a delta as they approach the sea. Their valleys are extremely fertile and produce an abundance of rice.

Al or **El.** Arabic definite article. It occurs as a prefix in several English words, such as alchemy, alcove, alembic, algebra, elixir. In some cases it is difficult to recognize; thus, apricot is ultimately derived from *albirquq*. As *al* in alhambra and alkoran signifies *the*, the addition of the English definite article before these and similar words is redundant and justified only by popular usage.

Alabama. River of the U.S.A. Formed by the junction of the Tallapoosa and the Coosa, it follows a sinuous W. and S.W. course to its confluence with the Tombigbee, their joint waters being carried thence by the Mobile to Mobile Bay. The Alabama flows through a richly timbered and cultivated region, and through a railway, and one of its head-streams, the Coosa, serves as a means of transport for the mining district in the central part of the state. Its chief tributary is the Cahawba, about 200 m. long. Montgomery, the state capital, lies on its left bank. Its length is 312 m., and it is navigable by small vessels.

Alabama. One of the states of the U.S.A. Organized as a territory in 1817, and admitted as a state Dec. 14, 1819, it has a short coast line on the Gulf of Mexico and is bounded N. by Tennessee, E. by Georgia, W. by Mississippi, and S. by Florida.

Its extreme length is about 335 m., average breadth about 180 m., and area 51,609 sq. m. Its chief river is the Alabama. The state is also drained by the Tennessee river, which traverses almost its entire breadth. Alabama is part of a great area, for the most part level, known as the southern coastal plain, which is believed to have emerged from the Gulf within recent geological time. It consists of wide lowlands largely under cultivation, but there are also in the S. extensive pine forests, yielding valuable timber. In the N.E. the surface is hilly.

The great cotton belt, consisting of extremely rich soil, lies in the S.E. corner, and here slavery had its strongest hold. The chief industry of the state is agriculture and the population, which averages 55.5 to the sq. m., is mainly rural. Maize and corn are the chief cereal crops, and the state raises normally about one-fifteenth of the country's cotton. Hay, peanuts, oats, potatoes, wheat, sugar, peaches, and tobacco are important crops. Rice is grown on the reclaimed wet lands of the Mobile valley, where there are also many gardens, which yield early vegetables. The output of coal amounts to 15 million short tons a year, and of pig iron to over three million tons. Birmingham is known as the Pittsburgh of the South. Several locks and dams associated with the Tennessee Valley Authority are situated in the state, which has shared the consequent benefit of increased hydro-electric power. Oil of a commercial quality has been worked since Feb., 1944. Cereals, cotton, timber, cattle, linseed, sugar, and tobacco are exported.

Excellent internal communication is afforded by the rivers, and over 5,000 m. of railways are in operation. The state is served by the Delta, Eastern, and Pennsylvania air lines. The university of Alabama (1831) is the principal educational institution. Nine representatives and two senators are returned to Congress.

Though the state ranks 28th by size, it is 17th by population. The chief cities are Birmingham, the centre of the iron and steel manufactures, with a population of 267,553; Mobile, the only seaport, with 78,720, and Montgomery, the capital, with 78,084. The population at the census of 1940 was 2,832,961, of whom 1,849,671 were whites and 983,290

negroes, with a few hundred (Red) Indians, etc. Alabama was first visited by Spaniards, and in 1539 by De Soto. The French settled there in 1702. It was ceded to the British in 1763 and gradually acquired by the U.S.A. At Montgomery, Feb. 4, 1861, the existence of the Confederate states was voted. *Consult* Alabama, a Social and Economic History, M. B. Owen, 1938.

Alabama Question. Dispute between Great Britain and the U.S.A. On July 29, 1862, during the American Civil War, the Alabama, a vessel just built at Birkenhead, sailed for the Azores. There she was armed, and, hoisting the Confederate flag under Captain Semmes, did enormous damage to the shipping of the North, until sunk, June 19, 1864, off Cherbourg, by the Kearsage, under Captain Winslow.

The Federal Government laid the blame on Great Britain. Contrary to the proper observance of neutrality, the vessel had been allowed to leave an English port, although the United States consul at Liverpool had acquainted the authorities with her real character. By the time they had ordered the seizure of the vessel, she had sailed. In 1871 a treaty for the settlement of the question by arbitration was signed at Washington. The claims included those for damage done by two other vessels, the Florida and the Shenandoah.

The five arbitrators were Sir Alexander Cockburn for Great Britain, Mr. C. F. Adams for America, and one each from Italy, Switzerland, and Brazil. They met at Geneva Dec. 15, 1871, under the presidency of the Italian representative, and adjourned until the following June. After a disagreement affecting indirect claims had been settled, the arbitrators decided unanimously that Britain was responsible for the damage done by the Alabama, and by a majority that she was responsible for that done by the other vessels. The final award was signed Sept. 14, 1872, the damage being assessed at 15,500,000 dols., about £3,230,000.

Alabamine. Chemical element of the radioactive series, symbol Ab and atomic no. 85. Its atomic weight is 221. A very rare element, it has not been certainly isolated.

Alabaster. Massive translucent form of gypsum. It is often found associated with salt-deposits in the form of beds and nodular

masses. It occurs in the Triassic rocks of Britain, and is used as an ornamental stone. According to Pliny, the name is derived from Alabastron, a town in Egypt, whence it was obtained. A calcite alabaster was used in ancient times for ointment vases. Banded marbles of this type (onyx) came from Algeria, Egypt, and Mexico.

Alabat. One of the smaller of the Philippine Islands. Lying to the N. of the Luzon isthmus, in Lamon Bay, it covers an area of 95 sq. m., and has a well-wooded interior. It is thinly populated.

Alachua. Former Seminole town of Florida, U.S.A. It was settled about 1710 by Creeks, who came from Oconee in Georgia, and the name was later made to cover other villages in the neighbourhood. The Alachua Indians resisted the incursion of white colonists early in the 19th century, and were prominently concerned in the Seminole War of 1835-42.

Ala Dag. Mountain range in Turkish Armenia, N. of Lake Van. The alt. is about 11,400 ft.

Aladdin. Hero of a story included in most English and French versions of The Arabian Nights' Entertainments, although not in any Arabic text of The Thousand and One Nights. The story tells how Aladdin, the son of a poor widow, meets an African magician and becomes possessed of a wonderful lamp. Helped by the genie, who appears whenever the lamp is rubbed, Aladdin provides himself with jewels and fine clothes, and wins the hand of Princess Badroulboudour, the sultan of China's daughter. The magician employs all his arts to regain the lamp, among other devices offering, in the guise of an itinerant merchant, "new lamps for old." The magic lamp which fulfils its owner's wishes occurs in the folk-lore of nearly all Europe as well as that of India and China.

Alagoas. Maritime state of Brazil, on the Atlantic coast, between Pernambuco and Sergipe. Coastwards, where there are lagoons, the country is low and marshy; to the N.W., mountainous and forested. The products include sugar, dye-woods, cotton, tobacco, and coffee. There is rly. connexion with Pernambuco. Maceió is the capital and chief port. Other towns are Alagoas and Penedo, a port on the São Francisco river. Area 22,577 sq. m. Pop. 1,043,600.

Alagon. River of Spain. It flows 120 m. to the Tagus, near Alcantara, and is noted for its fish.

Alagos OR ALI-GHEZ. Mt. of Transcaucasia, in Armenia S.S.R. Of volcanic formation, it has an alt. of 13,450 ft.

Alais. Town of France, in the department of Gard. On the river Gardon, it lies at the foot of the Cévennes, 25 m. N.N.W. of Nîmes, and is a junction on the Paris-Lyons Rly. Its buildings include the church of St. Jean, a citadel, and a school of mines. It has many silk mills and a large trade in cocoons and ribbons. The centre of a mineral field producing coal, iron, lead, zinc, and asphalt, it has large iron-works and glass, brick, tile, and cloth manufactures. It was taken from the Huguenots by Louis XIII in 1629, when the Peace of Alais closed the civil wars in France. Pop. 36,400.

Alai Tagh. Mt. chain in Kirghiz S.S.R., a western continuation of the Tian-Shan system. The Trans-Alai, a parallel chain on the S. side of the Alai valley, includes Mt. Stalin (24,590 ft.) and Mt. Lenin (23,383 ft.).

Alajuela. Capital of Alajuela province, Costa Rica, Central America. It is 15 m. W. of San José on the rly. to Punta Arenas and has a large trade in sugar and coffee. The prov. contains the Aguacate gold mines. Pop. prov., 152,713; town, 10,170.

Ala-Kul OR KURGH-NOR. Lake in Kazakh S.S.R., near the border with Sinkiang. It is 45 m. long, 20 m. broad, and 837 ft. above sea level.

Alaman, LUCAS (1792-1853). Mexican statesman and historian. After sitting as deputy for the colony in the Spanish Cortes, he returned in 1823 to Mexico, and became foreign minister. He wrote an important history of Mexico.

Alamanni OR ALEMANNI. Name given to a confederacy of Germanic tribes which first came into prominence around the river Moenus (Main) in the 3rd century A.D. The duchy of Alamannia or Swabia was named after them, and from them are derived the French names of Allemand and Allemagne for German and Germany. At one time they spread into Alsace and Switzerland. They fought against the Romans and Franks, but were subdued by Clovis in 496.

Alameda. City of California, U.S.A., in Alameda co. It is on San Francisco Bay, opposite San Francisco and adjacent to Oakland, and is a summer resort, with shipbuilding, petroleum, and earthenware industries. Pop. 36,256.

for just such a move. After two days of fierce fighting, with heavy tank losses on both sides, the 8th army held Rommel. Throughout Sept. 2 his armour remained massed behind the British lines, under heavy shell fire; then, on Sept. 3, 4 and 5, it withdrew, leaving 42 German and 11 Italian tanks and nearly 700 motor vehicles behind it.

Alexander was now free to prepare his great counter-stroke. At last he was to have equipment in plenty and of the type he needed—better tanks and more of them, Crusaders and Grants and the 300 Shermans, originally allotted to the U.S. army, which the U.S. president had so generously diverted; an adequate tank recovery and repair organization; more and better guns, notably self-propelled guns and the 6-pounder anti-tank; vastly expanded air forces, which included three (by Jan., 1943, eight) squadrons of the U.S. 9th A.A.F.; and the organization for greatly developed lines of communication.

As to training, too, the 8th army had profited by its hard experience. In the fighting ahead it was to use a new technique of armoured warfare in face of mines and anti-tank guns; it was to revert to those old principles of artillery employment, centralised control and concentration of fire, and so to make the best use of its guns; and it was to perfect a system whereby concentrated air power could be applied at the decisive point in the minimum of time. Moreover, the 8th army, closing from the E., would be but one claw of the pincers, the other claw of which would close from the W. at Casablanca.

Alexander would not attack, however, until he had won command of the air and completed his preparations for the pursuit across Cyrenaica. Meanwhile the ceaseless attacks on Rommel's communications, both by aircraft and by submarine, continued. Soon his ammunition and petrol reserves began to run dangerously low, but he still maintained the equivalent of about 12 divisions.

By Oct. 23 the preliminary battle of the air had been won, and Montgomery had completed his concentration at Alamein for the land battle. Between sea and depression, the two opposing armies faced each other, behind their two front lines of minefields and strong-points.

The popular legend, fostered by semi-official accounts of the battle, that Rommel deliberately weak-

ened his centre as a trap for the 8th army is untrue. In fact, Axis troops, commanded by Gen. Stumme—Rommel had gone to Germany sick in Sept.—were fairly evenly divided. The N. sector, held by two Italian and one German divs., was stronger than the S., held by the best of the Italian divs. Stumme split his armour into battle groups, stationed evenly along the whole front.

Montgomery, with Alexander's approval, proposed to make his main attack in the N., where Stumme's front was strongest, and a secondary attack in the S. To this end he had divided his own front between two corps; in the N. he had placed the 30th corps, whose five infantry divisions were to deliver the main attack; in the S. the 13th corps, whose two infantry divisions—together with the 7th armoured division and the Fighting French—were to deliver attacks mainly diversionary in character.

The British Attack

At 9.40 p.m. on the bright moonlight night of Oct. 23, nearly 1,000 guns massed on a 6-mile front in the N. opened a 15 minutes' counter-battery bom-

proved necessary. The two armoured divisions, however, were committed as early as Oct. 24 according to the original plan, and there followed anxious days of indecisive fighting marked by heavy tank losses. At last, Oct. 26-28, the 1st armoured div. of 10th corps with the 7th armoured div. of 13th corps and the 2nd New Zealand div. were withdrawn to reorganize.

Stumme died of a heart attack on Oct. 23, and Rommel was back in command on the 26th. Massed Axis tank attacks followed, but were beaten off. Then at 1.15 a.m. on Nov. 2 the 2nd N.Z. div. with 151 and 152 bdes. under command delivered a new attack. The breach was made, and the 10th corps passed through, followed by the 7th armoured div. By this time Rommel, too, had concentrated all his armour in the N., and by 6 a.m. on Nov. 2 the opposing armour met in head-on collision. In the heavy fighting that followed round Tell el Aqqaqir (Akakir), the 1st armoured div. and the 9th armoured bde. particularly distinguished themselves. By the night of Nov. 2-3 Rommel's armour was broken, and he had begun to withdraw. By Nov. 4 he was in full retreat, pursued by the R.A.F. and 10th corps, now regrouped for pursuit with 1st, 7th, and 10th divs. under command.

From the N., meanwhile, the 2nd New Zealand division had swung S. across the line of retreat of the Italians, who—



Alamein. Australians approaching an enemy strong-point under cover of a smoke screen on Oct. 24, 1942

bardment of Stumme's gun-positions. Then, at 10 p.m., both the 30th and the 13th corps attacked. At the same time the new 10th corps, consisting of the 1st and 10th armoured divisions which had been held far back behind the front, moved up secretly behind the 30th corps, ready to break through as soon as the 30th corps had punched a hole for it.

Such was the plan as originally conceived. And such was the plan as finally carried out—with this difference: the time which the 30th corps would take to prepare the way for the tanks had been estimated as a matter of hours, whereas in the outcome nine days of infantry fighting and air attack

transport commandeered by the Germans—surrendered in droves. In all, the battle cost Rommel 55,000 men (two-thirds of his force), 450 tanks, and 1,000 guns—against the 13,500 casualties (less than 8 per cent) suffered by Montgomery.

By Nov. 12 the 8th army had driven the enemy beyond the Egyptian frontier, and was well away on its great pursuit, which was to carry it over 1,400 miles of desert in the 2½ months to come. Four days earlier, on Nov. 8, U.S. troops had landed at Casablanca. Consult *The African Campaign*, 10th Aug., 1942, to 13th May, 1943, Alexander's dispatch, H.M.S.O. 38196, 1948.

Alan, A. J. Pseudonym of a British broadcaster, Leslie Harrison Lambert (d. Dec. 12, 1941). He was a pioneer in the art of story-telling at the microphone, his stories being narratives of alleged personal adventure, related with a studied informality, and always ending abruptly, with a hint of some significant facts that remained unspoken. He broadcast his first story, *My Adventure in Jermyn Street*, in 1924. The mystery of his identity, sedulously fostered and strictly maintained until his death, did not detract from his great popularity.

Alanbrooke, ALAN FRANCIS BROOKE, 1ST VISCOUNT (b. 1883). British soldier. Born July 23, 1883,



Lord Alanbrooke,
British soldier

at Bagnères de Bigorre, France, he was educated abroad and at the Royal Military Academy, Woolwich, joining the Royal Field Artillery in 1902. Serving throughout the First Great War in France, he commanded the 8th Infantry Brigade 1934-35, and was G.O.C.-in-C. Anti-Aircraft Command in 1939. Brooke then went to France with the B.E.F. as commander of the 2nd Corps; and in July 1940 succeeded Ironside (*q.v.*) as C.-in-C. Home Forces. On Nov. 25, 1941, he was appointed chief of the Imperial General Staff in succession to Dill, and was promoted field marshal in 1944. In Aug., 1945, Brooke was created a baron, taking the title of Lord Alanbrooke. In Jan., 1946, he received a viscounty, and in the following June the O.M. He retired from the army the same summer. He is an expert in gunnery in all branches and an authority on mechanization.

Alans OR ALANI. A barbarian tribe of Sarmatian race. From their home in the Caucasus they ravaged the eastern provinces of the Roman empire; in A.D. 276 they were defeated in Asia Minor by the emperor Tacitus. In the 4th century they were conquered by the Huns and divided into two main branches. One went westwards with the conquerors; the other took up its abode in the Caucasus, where it is represented by the Ossetes.

Alaotra. Lake of Madagascar. Situated 75 m. N.W. of Tamatave, it is 38 m. long.

Alarcon y Mendoza, JUAN RUIZ DE (c. 1581-1639). A Spanish dramatist. Born in Mexico, he studied at Salamanca and lived mostly in Spain. In 1613 he produced his first play, which was unsuccessful. The best of his later plays are *Truth Suspected*, *Walls Have Ears*, *The Weaver of Segovia*, and *Winning Friends*. He died at Madrid, Aug. 4, 1639. His works were published in collected editions in 1852 and 1884.

Alaric I (376-410). King of the Visigoths. On the death of the emperor Theodosius in 395 the Goths revolted under Alaric, a youthful chief belonging to one of their noblest families, the Balts. Alaric overran Greece and Epirus, thereby securing from the eastern emperor, Arcadius, the imperial office of captain general of Illyricum, while the Goths honoured the successful chief by electing him their king. Alaric soon turned his arms against Italy. In 403 he was checked at Pollentia by the imperial general Stilicho, who held him at bay for five years. The execution of Stilicho in 408 on a charge of treason left Alaric without any capable adversary. In 408 and 409 he ravaged N. Italy, exacting ransom from Rome, and in 410 stormed and sacked Rome itself, which no foreign foe had entered for 800 years. The destruction wrought by the barbarians was accompanied by remarkable instances of clemency. From Rome Alaric overran S. Italy, but died suddenly while invading Sicily. His successor Ataulf withdrew the Goths from Italy. *Consult* Italy and Her Invaders, T. Hodgkin, 1892.

Alaric II (d. 507). King of the Visigoths. He succeeded his father Euric as eighth king in 485. Though an Arian, he permitted the Catholic synod of Agde to be held, 506. On the score of his heterodoxy he was attacked by the newly baptized Frank king, Clovis, who defeated the Goths at the Campus Vogladensis (Vouillé), near Poitiers, in 507. Alaric was slain in the rout after the battle. The legal code known as the *Breviary* of Alaric was compiled in his reign.

Alas, LEOPOLDO (1852-1901). Spanish critic and author, known by his pen-name of Clarin. He was a professor of the university of Oviedo, and one of his novels, *La Regenta*, takes high rank in modern Spanish fiction.

Alasehir. City of Asiatic Turkey, in Manisa vilayet. The ancient Philadelphia, it is 104 m.

by rly. E. of Izmir. It has many remains of antiquity, and a trade in natural mineral waters, cereals, cotton, and tobacco. It was founded about 150 B.C. by Attalus Philadelphus, king of Pergamos, and is supposed to have been one of the Seven Churches of Asia. Pop. 33,000.

Ala-shan. Mt. range of China. Extending 150 m. from N.E. to S.W., it separates the Mongolian territories of Ordos and Ala-shan. Its greatest height is over 11,000 ft.

Ala-shan OR HSI-TAU. Territory of Inner Mongolia. It is bordered S. and W. by the Chinese prov. of Kan-su, E. by the Ala-shan range and the Hwang-ho. Called also Little Gobi, it is part of the Gobi desert and is sparsely peopled by Kalmucks.

Alaska. Trade name for a textile yarn made up of undyed wool or mohair and cotton which is combined by carding or drawing processes. It is woven into cloth for women's coats and dresses.

Alaska (Aleut. *alak'shak*, or *al-ay' ek-sa*, a great country or continent). Territory of the U.S.A. In the extreme N.W. of N. America, it was purchased from Russia by the U.S.A. in 1867 for \$7,200,000 (about £1,450,000), and constituted a territory in 1912. The main E. boundary is formed by the 141st W. meridian, but the territory continues also S.E. along the coast for about 500 m., and takes in a narrow strip of the mainland and the islands of the Alexander Archipelago. The curved chain of the Aleutian Islands, extending over 1,500 m., also forms part of Alaska.

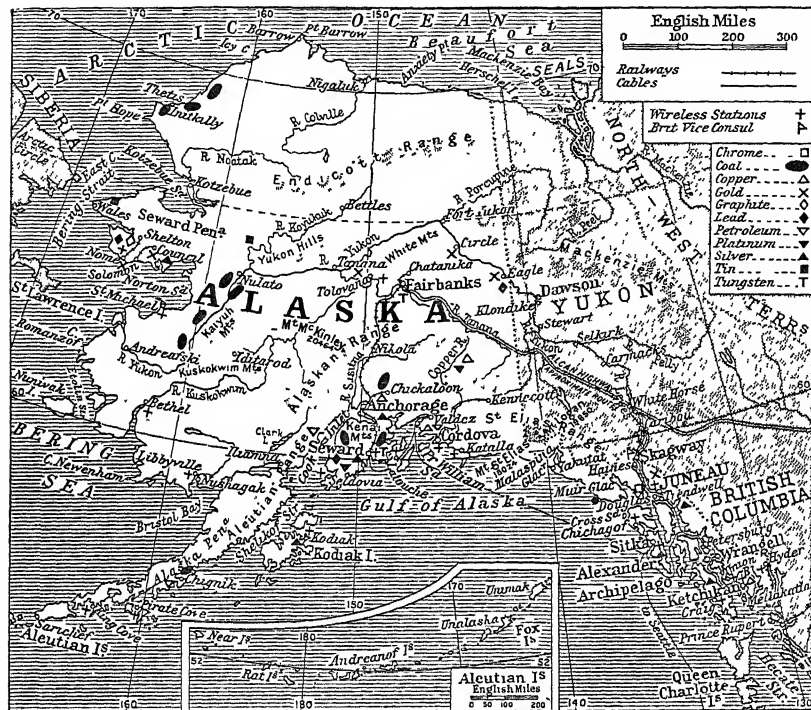
PHYSICAL FEATURES. The total area is 586,400 sq. m., or nearly five times that of the British Isles, about one-third being situated within the Arctic Circle. The irregular coastline, which extends to 26,000 m., exceeds that of the whole of the U.S.A. The country in the S. and S.E. is extremely mountainous, and contains several of the highest summits of N. America, notably Mt. McKinley (20,464 ft.), the loftiest in the continent, and Mt. St. Elias (18,024 ft.). From the snow-caps of the mt. chains huge glaciers descend to the sea; of these the best known are Muir Glacier and the Malaspina Glacier, flowing from the St. Elias range.

Numerous active and quiescent volcanoes are met with from Cross Sound to the Aleutian Islands, the action of which has doubtless been responsible for the irregular configuration of the land

in this belt. The N. and central region is a vast plateau, with low tundras or treeless steppes extending inland for many miles, broken at intervals by mts. and dotted with innumerable lakes and swamps. The Yukon river, navigable for upwards of 1,850 m., with its tributaries, forms one of

Canada and the U.S.A. The Richardson Highway runs from Valdez to Fairbanks (371 m.), and other roads link up with Matanuska, and with the Yukon river at Circle. There is steamer transport on the Yukon and Tanana rivers. Airways are extensively used; for example, Nome, in the

communities have grown up in the Matanuska valley and in the region of Fairbanks, though in 1939 only about 7,000 acres were harvested. Most of the hardy grains and vegetables can be grown S. of the Arctic Circle, and dairy and poultry farming have been developed to a considerable extent.



Alaska. The north-west extremity of the North American continent, where it is divided from Asia by Bering Strait. It was bought by the United States from Russia in 1867

the important drainage systems of the world; about 1,600 m. of its course pass through Alaska. The climate has a wide range; under the influence of the ocean the S. portion of the coast has a mild temperature, while in the interior the frosts of winter are said to penetrate 30 yds. below the surface. The rainfall is plentiful; at Sitka the mean annual fall registers more than 80 ins., and on some parts of the coast and in the islands as many as 110 ins. are recorded. In the interior and the N. the fall is inconsiderable.

COMMUNICATIONS. The Alaska Railroad, completed in 1923, runs from the ports of Seward and Whittier as far as Fairbanks. The opening in 1942 of the Alcan Highway (*q.v.*), constructed as a war measure to facilitate the supply of U.S. forces in the Aleutian Islands, brought Alaska into direct road communication with

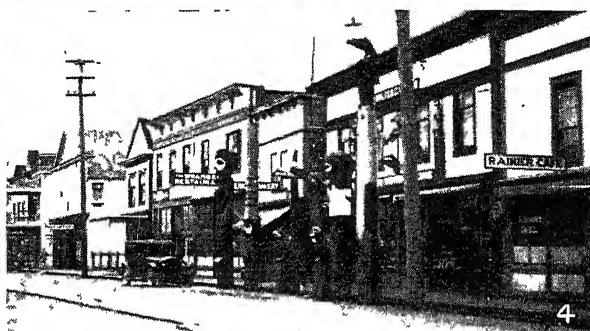
Seward peninsula, is connected with Fairbanks by a daily air service. Another regular service links Fairbanks with Seattle, Washington.

INDUSTRIES. The fur-bearing animals, moose, fox, beaver, and mink, are decreasing, but fur-seals and otters are caught in numbers limited by official regulations. Mt. McKinley National Park (over 3,000 sq. m.) was established in 1917 primarily to preserve the wild game. More important is the huge catch of salmon, which provides the basis for the large canning industry. In 1939 the fishing and canning industries provided employment for about one-third of the total population. Cod, herring, and halibut are also caught in abundance. The national forests cover a surface of more than 20 million acres, and yield white spruce and excellent yellow cedar. Farming

Coal-mining is an increasing industry, chiefly at Eska Creek. Copper is mined near the Copper river, Prince William Sound, and in the Ketchikan district. Gold is mined in several areas, notably in the Yukon region and at several places on the W. coast; the chief development of quartz-mining is at Juneau, while centres of lode mining are Fairbanks and Tolovana in the Yukon valley, Seward, Circle, and Tolstoi. Graphite is obtained in the Seward Peninsula. Platinum is mined in the Seward and Copper river districts and tungsten near Seward and Fairbanks.

Other deposits awaiting full development are chromium, antimony and tin. There is a large petroleum reserve in the N.

POPULATION, GOVERNMENT, ETC. The natives are of two stocks: the Eskimo, or Innuut, and the Indian. The Aleuts, a branch of the Innuits, inhabit the Alaskan peninsula and the Aleutian Islands, and the Eskimos are found on the N. and W. coasts. Indian tribes occupy the interior and the S.E. The revenue of Alaska is gained by the issue of licences to trade in various articles; there is scarcely any other taxation. There are ample educational facilities, the University of Alaska, near Fairbanks, being maintained partly by Federal funds. The territory has its own legislative assembly of 16 senators and 24 representatives, which meets biennially at Juneau. There is a governor, appointed by the president of the U.S.A., who holds office for four years, and a delegate to Congress, elected every two years, though without power to vote. The principal



Alaska. 1. Sitka, the capital when Alaska was Russian, now an important U.S. naval seaplane base. 2. Indian woman curing fish. 3. Caribou-reindeer herd on the Lower Yukon. 4. Main street of Wrangell, the water-logged roadway paved with planks; on the right is a totem store. 5. Juneau, the capital and one of the principal seaports. 6. Eskimo natives in winter dress

owns, all small, are on the coasts; Juneau, the capital, has a population of 5,729, Ketchikan 4,695, Anchorage 3,495, Fairbanks 3,455, Sitka 1,987, and Nome 1,559. Alaska has little more than one person to each eight sq. m. The pop. at the census of 1940 was 72,524, of whom 39,170 were white. Bering, the Danish navigator (*q.v.*), first explored Alaska in 1741 and three years later it be-

came a Russian settlement. Its boundary dispute with Canada was finally settled by an international tribunal, which met in London in 1903.

Alaska, GULF OF. Opening of the N. Pacific on the S. coast of Alaska. It contains Kodiak and other islands, and in the N. the Kenai Peninsula forms the two arms of Cook Inlet and Prince William Sound.

Alaska Highway. First name given to the great U.S.-Canadian motor road, later known as the Alcan Highway (*q.v.*).

Alaskan Range. Chain of mts. in S. Alaska. It curves N.E. from the Aleutian Range to the Tanana valley, and culminates in Mt. McKinley, 20,300 ft. high.

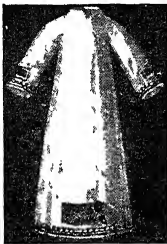
Alastor. In Greek mythology, name applied to avenging deities who pursued sinners and

incited them to commit fresh crimes. It is an epithet of Zeus and the Furies, and is also used in the sense of a great sinner. Alastor, or the Spirit of Solitude, is the title of a poem by Shelley.

Ala-tau. District of Kazakh S.S.R., and name of several mt. ranges on the borders of Kazakh S.S.R., Kirghiz S.S.R., and Sinkiang. They form part of the Tian-shan system, N. and S. of the Ili, and their greatest height is nearly 15,000 ft. The Terskei Ala-tau runs S. of Lake Issyk-kul, in Kirghiz S.S.R.; the Kunghei and Trans-Ili Mts. stretch E. and W. on the N. side of the lake; and the Zungarian range, farther N., trends E. to W.

Alava. Southernmost and largest of the Basque provs. of Spain. Watered by the Zadorra, a tributary of the Ebro, it is largely mountainous, produces iron, copper, lead, marble, and timber, and contains several mineral springs. Cattle and sheep are reared, and maize, hemp, flax, and fruit grown. The area is 1,175 sq. m. and Vitoria is the capital. Pop. 116,090.

Alb (Lat. *albus*, white). Eccles. vestment of white linen, with openings at the neck and foot. It has tight sleeves, and reaches to the feet, being gathered at the waist by a girdle. In the Roman Catholic Church it is always worn under other eucharistic vestments by bishops, priests and deacons at Mass and frequently by acolytes, and it is often ornamented with pieces of embroidery called apparels. Its use in the Church of England, abandoned under Elizabeth, was revived partially in the 19th century. See Vestments.



Alb, decorated with apparels

Alba. Town of Italy, in Cuneo province. It is situated on the Tanaro, 42 m. by rly. S.E. of Turin. Its Gothic cathedral of S. Lorenzo was rebuilt after 1486, and it has a museum of local antiquities. Its chief trade is in wine, and silkworms are reared locally. It is on the site of Alba Pompeia, founded about 100 B.C. Pop. 13,740.

Alba, JACOBO MARIA DEL PILAR CARLOS MANUEL, 17th DUKE OF; FITZ-JAMES STUART, BERWICK, 10th DUKE OF (b. 1878). Spanish diplomat. Born Oct. 17, 1878, and educated at Beaumont, he

was Spanish minister of education, 1930, and foreign minister, 1930-31. A staunch monarchist, he continued to support the royalist party after the abdication of Alphonso XIII, but compromised with the Franco regime, and was Spanish ambassador to Great Britain, 1939-45. He resigned when the claimant to the Spanish throne, Don Juan, expressed disapproval of Franco's regime. See Alva, duke of; Berwick duke of.

Albacete. Prov. of S.E. Spain, formed of parts of New Castile and Murcia. Hilly and mountainous, with wide plains and fertile valleys, it is watered by the Júcar and Segura. Fruit is grown, stock rearing is a great industry, cutlery is manufactured, bees and silkworms are reared, and wine is made. Area, 5,737 sq. m. Pop. 390,333.

Albacete. City of Spain. Capital of Albacete province, 140 m. by rly. S.E. of Madrid, it is a large cattle-market, manufactures matches, and is famed for its knives and daggers. Pop. 74,565.

Albacore. Species of long-finned tunny (*Germo alalunga*) often about 3 ft. in length, particularly common in the spawning season off the S. coast of California, but also found in the Mediterranean and other temperate or tropical seas. See Tunny.

Alba Julia. Town of Transylvania, Rumania, formerly known as Karlsburg. It is situated on the Maros, 48 m. S. of Cluj (Kolozsvár). An historic town, it was the Roman Apulum, and later the capital of Transylvania. Pop. 12,457.

Alba Longa. First of Latin cities and mother city of Rome. Presumably it was situated on a ridge above the Alban Lake, 15 m. S.E. of Rome. Legend ascribes its foundation to Ascanius, son of Aeneas, some 300 years before the foundation of Rome. See Rome.

Alban. British saint and martyr. According to tradition he was born in the 3rd century at Verulamium, now known as St. Albans, and was converted A.D. 304 by a fugitive Christian priest whom he sheltered. Martyrdom quickly followed. A later version of the legend makes him a Roman soldier converted in Rome. His veneration in England dates from the 5th century, and the abbey of St. Albans was founded on the site of his martyrdom in 793. June 22 is S. Alban's festival, but the Church of England Calendar, in which it was placed in 1662, marks it June 17. See St. Albans.

Alban Hills. Group of volcanic mts. in Italy, E. of Rome.

Mons Albanus, now Monte Cavo (3,115 ft.), was the scene of military parades up to the temple on the top by Roman generals who were denied a triumphal entry into Rome. On the summits of the hills are small towns, including Albano, Frascati, Genzano, and Castel Gandolfo. Lakes Alban and Nemi lie to the S.

During the Second Great War the Germans established a strong defensive line in the Alban Hills in an attempt to protect Rome from the Allied advance in 1944. Heavy fighting occurred at the end of May, 1944, the Germans having made Frascati their chief garrison town. On June 3 American troops of the 5th army, within sight of Rome, drove the Germans from the important heights of Monte Cerraso and Colle Tano. The Germans were also compelled to abandon Monte Cavo. Other 5th army forces, advancing through the Alban Hills, captured Grottaferata (between Frascati and Lake Alban), Marino, and Genzano (on Lake Nemi).

Albanesi, MADAME (d. 1936). British novelist. Her name was Effie Henderson, and she was married to Chevalier Carlo Albanesi (d. 1926), a professor of music. As a novelist she gained early popularity and maintained a prolific output, some of her best-known titles being Peter, a Parasite, 1901; Susannah and One Elder, 1903; Capricious Caroline, 1904; The Brown Eyes of Mary, 1905; When Michael Comes to Town, 1917; The Green Country, 1927. She died Oct. 16, 1936. Her elder daughter, Meggie Albanesi, who died in 1923 at the age of 24, had already won distinction as an actress in emotional parts like those created by her in A Bill of Divorcement and East of Suez. A memoir, Meggie Albanesi, was published by her mother 1928.

Albani. Roman family, said to have come from Albania in the 16th century. Several members attained high ecclesiastical rank. Giovanni Francesco became pope in 1700 as Clement XI. His nephew Alessandro (1692-1779) was made a cardinal in 1721. A bitter opponent of the Stuarts, he used his influence with Pope Clement XIII to thwart Cardinal York's attempts to get his brother, Charles Edward Stuart, recognized by the pope as king of Great Britain. He built the Villa Albani, near Rome, where he formed a famous collection of antiquities, chiefly sculpture. Many of those were removed by Napoleon and

taken to Paris; they were restored in 1815. The present Albani collection contains some priceless examples of Greek sculpture. The family became extinct in 1852.

Albani, FRANCESCO (1578-1660). Italian painter. Born at Bologna, March 17, 1578, he studied under Denys Calvaert, the Flemish painter, and followed Guido Reni, one of his fellow pupils, to Rome. His most famous works are a fresco of Children in the Colonna Palace, Rome; Europa and the Bull in the Torlonia Palace, also in Rome; and the quartet of allegories representing the Four Elements, painted for Cardinal Maurice of Savoy. He died at Bologna, Oct. 4, 1660.



Francesco Albani, Italian painter

Albani, MADAME (1852-1930). Professional name of Marie Louise Cécile Emma Lajeunesse, soprano singer. Born Nov. 1, 1852, near Montreal, of French-Canadian parents, and educated at Albany, New York (hence the name Albani), at the age of 15 she was organist of the Church of the Sacred Heart, New York. After studying in Paris and Milan, she made her début in 1870 at Messina as Amina in La Sonnambula, and appeared first in London in 1872. She was for many years the leading soprano in opera and oratorio. In 1878 Mme. Albani married Ernest Gye. She was made D.B.E. in 1925. She retired in 1911, and died April 3, 1930. Consult her memoirs, *Forty Years of Song*, 1911.



Madame Albani, soprano singer

and hardy, and make splendid soldiers.

The principal towns are Tirana, the capital, Durres (Durazzo), Scutari, Koritza (Korçe), Elbasan, Vlonë (Valona), and Berat. The ports are Durazzo, Valona, Shenghin, and Saraudë (renamed by the Italians Porto Edda).

HISTORY. The early history of Albania is obscure, but in Roman-Byzantine times the upper portion of the country was included in the province of Illyria, the lower in that of Epirus. From Dyrrachium, the ancient forerunner of the modern Durazzo, stretched the great Via Egnatia, Rome's road to the East by way of Elbasan and Ochrida. Albania shared the vicissitudes of southern Europe on the collapse of the Byzantine Empire, and in 1748 became a province of Turkey. Before that its people had adopted Christianity, but most of them turned Mahomedan afterwards. In the N. the Mirdites and other tribes are Roman Catholic, and in the S. some belong to the Greek church, but about two-thirds of the population are Mahomedan.

In spite of many rebellions, in the course of which it nearly became independent, Albania remained under the Turks until, as a result of the First Balkan War, it was constituted an autonomous state by the Great Powers in 1912-13. By the Treaty of Berlin, 1878, it had already been reduced in area, parts being given to Austria, Montenegro, Serbia, and Greece; and the provisional frontiers assigned to it in 1912-13 by the London Conference indicated a further loss of territory.

The First Great War

In July, 1913, the London Conference created an international commission of control for Albania, and decided that a European prince should rule over the country. An Albanian deputation offered the crown to Prince William of Wied in February, 1914, and he arrived at Durazzo the following month, being styled mpret, a corruption of *imperator*. But when Austria declared war on Serbia on July 28, William, with most of the members of the international commission, left Albania to look after itself, whereupon its condition became anarchic. An attempt to set up a military government failed in a few weeks. In Nov., 1914, Greece occupied N. Epirus, though formal possession was not claimed until 1916, and even then went unrecog-

ALBANIA: BALKAN LAND OF CONFLICT

Robert Machray, Writer on Foreign Affairs

The story of a small country of such strategic importance to other powers that it has rarely enjoyed a real independence. See also Balkan Wars; Italy; Greece; Adriatic; and under the names of towns, e.g. Tirana; Durazzo; Valona

Albania is a mountainous country on the W. side of the Balkan peninsula, with an area of about 11,000 sq. m. It is bounded on the N. and E. by Yugoslavia, on the S. by Greece, and on the W. by the Adriatic. The name is derived from the word *alb* or *alop*, white; but the inhabitants, Gheqs in the N. and Tosks in the S., call it Shquiperia. The population at the census of 1930 was 1,003,124.

For the most part the land is a wild tangle of mountains, a continuation of the Alpine ranges of Bosnia and Dalmatia, and of high valleys watered by small, swift streams, chief of which are the Drin, Boyana, Shkumbi, Semeni, Devoli, and Vjosoë. In the centre a certain extent of the plateau is cultivable, and in the S. there is fertile alluvial land in the river valleys, with grazing land on the slopes. The coast is marked by rocky headlands, swamps, and lagoons, with some arable land.

There is little agriculture, but in a few districts fair crops of maize are raised, and olives, vines, mulberries, and other fruits are grown. Their flocks and herds provide the main subsistence of the people. Albania has little outside trade. One of the chief exports is bitumen from Selenitza in the Vjosoë valley. An Italian

company has worked the oil deposits in the Devoli basin. The great majority of the inhabitants are only half civilized, yet they obey rough laws and codes of their own, including the vendetta, or blood-feud, under tribal leaders whose position resembles that of the old Scottish Highland chiefs. In general the people are brave



Albania. Mountainous country on the eastern shore of the Adriatic Sea



Albania. 1. Main square in Tirana, with modern hotels and a motor omnibus (right) about to start. 2. Street in Scutari, showing the market on the left and bazaars on the right. 3. Dwellers in the mountains, some clad in sheepskins, on a visit to Tirana. 4. Women of Durazzo gossip round a well. 5. Fine type of old man from the E. borders

nized by the Great Powers. Meanwhile disorder continued.

Italy declared war on Austria in May, 1915. In previous negotiations Italy had demanded Austria's recognition of her claim to Valona and the renunciation of all Austrian claims in Albania. Austria refused, and on Dec. 15, 1915, Italian troops landed at Valona and at other points in S. Albania. The Austrians, after their conquest of Montenegro in Jan., 1916, advanced southwards into Albania in pursuit of the Serbians. But by this time the Serbians had escaped to Corfu in Allied ships, and a large Italian force was concentrated at Valona, with outposts as far N. as the Vijose, where they were in contact with Austrian advance guards. In June, 1917, Italy proclaimed Albania to be under her protection. Austria promptly retaliated by announcing her own protectorate of the country.

After a year of intermittent fighting, the Italians pushed northward, and, in conjunction with French troops, reached the Semeni and the Devoli valley and took Berat. On the capitulation of Bulgaria in Sept., 1918, the Austrians gradually withdrew, and all Albania was occupied by the Italians in Oct.-Nov. They remained there after the end of the war, but in the summer of 1919 their rule was challenged by an armed movement aiming at complete independence. The leader of the movement, Essad Pasha Topdani, was murdered in 1920, but an independent government was established at Tirana in Feb., 1920, and in June the Italians were forced back into Valona. This independence was confirmed by the Supreme Council of the Allies in Nov., 1921, also the pre-war boundaries with certain modifications. Nominally a constitutional monarchy, the coun-

try was ruled for a time by a council of four regents. But on Jan. 22, 1925, Ahmed Zogu, a former premier, contrived a *coup d'état*, and Albania was proclaimed a republic, with Zogu as president. In 1928 a constituent assembly declared for a monarchy, and Zogu became king under the name of Zog (q.v.). At the start he owed much of his success to Yugoslav help, but later he appeared to forget this fact and orientated his policy towards Italy. Italian influence, political and economic, continued to grow, and treaties were made with Italy in 1926 (the Treaty of Tirana) and 1927 (an amplification of the former Treaty into a military alliance) which purported to consolidate the *status quo*. In reality Albania became a protectorate of Italy.

On April 7 (Good Friday), 1939, Italian troops invaded Albania without warning and drove out Zog. A few days later the king

of Italy was proclaimed king of Albania, and a new constitution was decreed which placed supreme power in the hands of the king and a supreme Fascist corporative council after the Italian model. Foreign policy was declared to be the preserve of Italy.

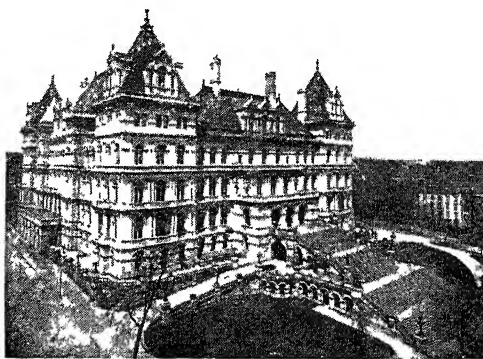
In Oct., 1940, after Italy had joined in the Second Great War as an Axis partner of Germany, an Italian army invaded Greece from Albanian soil, only to meet the most humiliating reverses. By Nov. 19 the invaders had been ejected from Greece, and southern Albania became a battlefield. The Greeks captured Koritza (Nov. 22) and Argyrokastron (Dec. 4), and by April, 1941, the battle-front ran from the coast about 20 m. S. of Valona to Lui, near the W. shore of L. Ochrida. But on April 23 the Greek army in Albania was involved in the surrender of the Epirus army, and the whole country reverted to Italian occupation, though increasing reliance was placed upon the superior strength of the German armies.

The collapse of Italy in the autumn of 1943 seriously weakened the Axis position throughout the Balkans, and though the Germans still retained their stranglehold upon the country the efforts of the Albanian partisans to free their land from the conqueror were to prove successful. In April, 1943, a British military mission began to operate in Albania. Led by Brig. E. F. Davies (subsequently in command of Land Forces Adriatic), this force formed and trained an army of some 20,000 Albanian partisans, and when at the end of Sept., 1944, the Germans started to withdraw, the partisans occupied many villages and important centres and harassed their retreat. Allied planes bombed strategic targets, disrupting lines of communication, thus assisting the partisans to liberate territory that had been seized by Italians or Germans. The Germans evacuated Tirana Nov. 18, 1944, partisans occupying it a few days later. Albania was declared a republic on Jan. 11, 1946, the king not having returned. For later information see N.V.

Alban Lake or **LAGO DI CASTELLO**. Small crater lake of central Italy, 15 m. S.E. of Rome. About 6 m. in circumference, it is at an alt. of 960 ft. and is about 560 ft. deep. Forbidding and sombre in aspect, it is fed by subterranean springs and drained by a

sluice and channel cut, according to Livy, by the Romans in 396 B.C. On its banks are Castel Gandolfo, with a papal palace, a château, now a convent but formerly a summer resort of the popes, the ruins of a villa of Domitian, and the town of Albano.

Albano. Town of Italy. On the S. slope of the Alban Hills, 15 m. S.E. of Rome, it is 1,230 ft. above sea level, and has remains of ancient buildings, including a house of Pompey and villas of the emperors Tiberius, Caligula, and Nero. It is now a summer resort and the seat of a bishop, and gives its name to a wine. In the Second Great War, when the Allied 5th army advanced through the Alban



Hills towards Rome, Albano was captured from the occupying Germans during the opening days of June, 1944.

Albany or **ALBAN**. Early name for that part of Scotland N. of the Forth and Clyde. Later, about 900, it referred to a district, formerly called Pictland, between the Forth and Clyde and the Spey. This had its own kings for about a century, and was afterwards the nucleus of the kingdom of Scotia, later Scotland. The word is a variant of Albion, probably the earliest name for the British Islands.

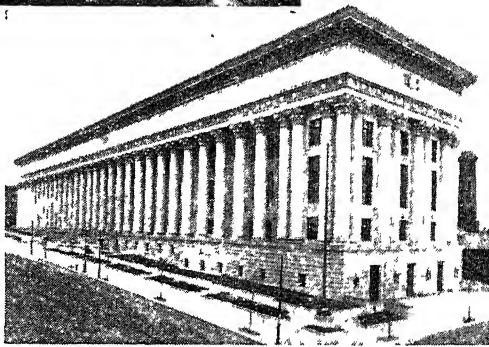
Albany. River of Canada. Formerly part of the boundary between Ontario and the Keewatin district, it is now wholly within the former. Rising in Lake S. Joseph, it flows about 450 m. E. and N. and empties at Fort Albany into James Bay.

Albany. Town of W. Australia, in Plantagenet county. On Princess Royal Harbour, King George Sound, 352 m. by rly. S.E. of Perth, it is a popular health resort by reason of its equable climate and fine scenery. Though its harbour is one of the best in Western Australia, it has been superseded by Fremantle. It is a port of call for S. African mail boats, and has brewing and leather industries. Pop. 4,000.

Albany. District in the S.E. of Cape Province, S. Africa. It was first settled during the administration of Lord Charles Somerset by 3,500 emigrants, who landed at Algoa Bay in 1820. These settlers formed the first considerable

body of emigrants assisted by the British government, and were a rampart against the incursions of the Kaffir tribes. Its area is 1,685 sq. m. and its capital is Grahamstown. Pop. 38,800.

Albany. City of the U.S.A., capital of New York State and of Albany county. It stands on



Albany, New York. The Education Building, in which are housed the State library and museum; above, the State Capitol

the W. bank of the Hudson river, 145 m. N. of New York City. An important industrial and commercial centre, its manufactured products cover an extensive range. The city has excellent railway facilities and river communication, as well as a municipal airport. The city owes its importance almost entirely to its situation at the fork of the valley-way from New York, one branch going W. to the Great Lakes, the other N. to Montreal. Its many handsome public buildings include the state capitol,

the city hall, the state hall, state museum, and many colleges and schools. There are also many fine examples of Dutch colonial building. Formerly a Dutch settlement, Albany was ceded to Great Britain in 1664, and named after the duke of York and Albany, afterwards James II. It was granted a charter in 1686, and in 1754 the first provincial congress met here to arrange the union of the colonies. In 1797 it became the state capital. Pop. 130,577

ALBANY, CONVENTION OF. Assembly of representatives from seven of the American colonies—Massachusetts, Connecticut, New Hampshire, Rhode Island, Pennsylvania, Maryland, and New York. In 1754 war between Great Britain and France was imminent, and the promoters of the conference desired a closer union between the colonies and the strengthening of their alliance with the Indians of the Five Nations. It was arranged with the Indians that they should take part in the war, and Franklin proposed a plan for a union of the colonies under a president-general, appointed by the English king, and a council of representatives. The convention approved the plan, but it was rejected by both the authorities in London and the colonists themselves. See Rise of the Republic. R. Frothingham, 1872.

ALBANY, COUNT OF. Title successively assumed by two brothers who claimed descent from Charles Edward Stuart, the Young Pretender. According to their own account this was through a son, born in 1773, of Louisa, countess of Albany. The elder, John Sobieski Stobberg Stuart (1797–1872), and the younger, Charles Edward Stuart (1799–1880), styled themselves variously Allan, Stuart Allan, Allan Stuart, Hay Allan, Hay Allan Stuart, Stuart Hay Allan. Their real name was Allen, their father being Thomas Allen, a naval officer. They fought for Napoleon at Dres-

den and Leipzig and perhaps at Waterloo. Their writings include *Tales of the Century*, *Vestiarium Scoticum*, a work on clan tartans, and *Lays of the Deer Forest*. They were buried at Eskdale, near the shooting-box on Eilean Aras built for them by Lord Lovat.

ALBANY, DUKE OF. Scottish title. The first duke was Robert, a brother of Robert III, king of Scotland, who was given the title in 1398. Some years later it became extinct, but was revived about 1450 for Alexander, a younger son of James II. In 1536 it again became extinct, when John Stewart, the 2nd duke, died. John was regent of Scotland during the minority of James V, and was a friend of Francis I of France. Lord Darnley, the husband of Mary Queen of Scots, was created duke of Albany in 1565, and from him the title passed to James I and the succeeding Stuart kings, and was claimed by the exiled descendants of James II. Ernest Augustus, a brother of George I, and Edward Augustus, a brother of George III, were in turn created duke of Albany, and both died without heirs, as also did the next duke, Frederick, a son of George III. In 1881 this ancient title was revived and bestowed by Queen Victoria on her youngest son, Prince Leopold.

ALBANY, LEOPOLD, DUKE OF (1853–84). Youngest son of Queen Victoria. He was born at Buckingham Palace, April 7, 1853, and studied at Oxford in 1872–6. Made a privy councillor in 1874, in 1881 he was created duke of Albany. In 1882 he married Helen Frederica Augusta, princess of Waldeck-Pyrmont, by whom he left a son and a daughter. He died at Cannes, March 28, 1884.



Prince Leopold,
Duke of Albany
Downey

His daughter Alice Mary was married in 1904 to Prince Alexander of Teck, afterwards earl of Athlone. His son, Leopold Charles, succeeded his uncle as duke of Saxe-Coburg in 1900, when he renounced his British nationality. During the First Great War, as a German prince he fought against Britain, and was deprived of his British titles in 1919.

ALBANY, LOUISA, COUNTESS OF (1752–1824). Wife of Charles Edward Stuart, the Young Pretender. Louisa was the eldest daughter of Prince Gustavus Adolphus of



Louisa, Countess
of Albany
Nat. Port. Gallery

Stohlberg-Gedern, and was born at Mons, Sept. 20, 1752. In 1772 she married Charles Edward Stuart, who styled himself count of Albany, but the union was childless and unhappy, and in 1780 she fled for protection to her brother-in-law, Cardinal York. In 1784 she was separated from her husband, who died four years later. After travelling with the Italian poet Alfieri she settled at Florence, where she died Jan. 29, 1824. Among her friends she numbered the French painter François Xavier Fabre of Montpellier, to whom she bequeathed all her property. Consult *The Last Stuart Queen*, H. M. Vaughan, 1910; *Louise of Albany*, G. R. Preedy, 1945.

ALBANY, THE. Building on the N. side of Piccadilly, near Burlington House. Erected on the site of Sunderland House, it was known as Piccadilly House until 1770, when Lord Holland sold it to Viscount Melbourne, by whom its name was changed to Melbourne House. He exchanged it for a mansion in Whitehall with the duke of York and Albany, after whom it was renamed and let out first as bachelors' chambers and more recently in flats. Byron, Lytton, and Macaulay are among the distinguished men who have resided there at one time or another. Modern residents usually prefer to speak of the building as Albany, omitting the definite article. Consult *Evenings in Albany*, C. Bax, 1942.

ALBATROSS. Name given to the genus *Diomedea* of the zoological order Tubinares, or tube-nosed birds, which includes the petrels. All birds of this order have the nostrils produced into tubes, which lie on the upper surface of the beak. Albatrosses are the largest marine



Albatross. Largest of the sea birds, and remarkable for the speed with which it can fly and for the long period during which it can keep on the wing

birds and are famed for strength of wing. When the wings are folded they give no suggestion of their size, and the bird looks not unlike a goose with a long bill; when extended they often measure 12 ft. from tip to tip. The bird itself only weighs from 16 lb. to 18 lb. Its plumage is white with a slight yellow tinge, barred irregularly with black on the wing coverts and sometimes on the back. The nostril tubes are placed wide apart on the sides of the beak, which is about six inches in length and sharply hooked at the tip. The feet are webbed, and the bird is a strong swimmer.

Except in the nesting season, the albatross spends all its time at sea and most of it on the wing. It will keep up for days together with a ship making 200 m. a day. It seems to glide along for astonishing distances without moving its wings, but if closely watched when on a level with the eye, it will be seen that extremely quick and short movements of the wings are constantly taking place.

The albatross is a native of the southern tropical and sub-tropical seas, but one species is sometimes found as far N. as Alaska. It nests in vast colonies on rocks and islands of the South Pacific Ocean, and Tristan da Cunha is one of its favourite places. It makes a round raised nest of clay and grass, about 14 ins. in diameter, and in the case of the smaller yellow-billed species lays a single white egg about the size of that of a goose. The egg of the wandering albatross is 5 ins. in length, speckled with red. These eggs are collected for the oil they contain. An old superstition of sailors that ill-luck attended the killing of an albatross at sea is the theme of Coleridge's poem *The Ancient Mariner*. The name is derived from the Portuguese *alcatraz*, pelican or cormorant, ultimately from the Arabic *al qadus* (bucket), the pelican being supposed to carry water in its pouch.

Al-Battani, Latinised as **ALBATEGNIUS** (c. 850-930). Arab prince and astronomer. Born at Batan, Mesopotamia, his observations were made for the most part at Rakka, whence he is sometimes known as *Mohamedes Aractensis*. He calculated the length of the solar year with great exactitude, and worked out tables for the movements of the planets. Astronomy owes to him the first numerical calculation of the eccentricity of the earth's path, as well as the discovery of the variation of the apsidal of the earth's orbit towards the signs of the Zodiac. He revised

Ptolemy's *Almagest*, and rendered service to trigonometry by the introduction of the use of sines in mathematical computations.

Albay. City of Luzon, Philippine Islands, also known as Legaspi. The capital of Albay prov., it stands on Albay Bay and is a centre of trade in hemp, cocoa, copra, and coconut oil. Coal mining is carried on. The prov. (about 1,000 sq. m.) is thickly wooded and fertile, and has gold and silver mines. Pop. 33,000.

Albedo (Lat. whiteness). Scientific term for the degree of reflected light of a planet or other member of the solar system, the light being that of the sun. The light reflected by the moon from the sun is the albedo of the moon. The moon's albedo is represented by the fraction 0.07. See *Light*.

Albemarle, **EARL OF**. British title, derived from the French town Aumale. It dates from the Norman Conquest, and has been revived at least four times. William de Fortibus (d. 1242), the rebel baron; Thomas, younger son of Henry IV; and Richard Beauchamp, earl of Warwick (d. 1423), are among the earlier earls of Aumale or Albemarle. The title was in abeyance for 200 years until Charles II conferred the dukedom of Albemarle on General Monk in 1660, and it expired on the death of his son Christopher, the 2nd duke, in 1688. William III, by making his Dutch favourite the soldier Arnold Joust van Keppel (d. 1718) earl of Albemarle, gave the title to the family of Keppel, by whom it has been borne to the present time. The 6th earl, George Thomas (1799-1891), who fought at Waterloo, was later a Liberal M.P., 1847-49, and succeeded to the title in 1851. The 9th earl, born 1882, succeeded in 1942.

Albemarle, **GEORGE MONK OR MONCK**, 1ST DUKE OF (1608-70). English soldier and politician. Born at Great Potheridge, Devon, Dec. 6, 1608, in early life he served in campaigns against France and Spain. About 1630 he crossed over to the Netherlands, where his reputation as a soldier was made. Returning to England about 1638, in time to help Charles I against the Scots and in Ireland, he remained in Ireland until 1644, when he returned to England, was taken prisoner at Nantwich, and passed the next two years in the Tower.

In 1646, released to become a soldier of the Parliament, he returned to Ireland. A successful governor of Ulster, in 1649 he

displeased the Parliament by making terms with the Irish, thus enabling some of his men to serve Charles II. Cromwell, however, believed in him; he held a command at Dunbar and remained to complete the subjugation of Scotland after his leader's departure for Worcester. Made a general at sea, Monk was one of the English commanders in the two victories of 1653 over the Dutch, but was soon on land again, fighting against the Royalists in Scotland. He was still in Scotland when Cromwell died, and was then approached by the agents of Charles II. Cautious as ever, it was only after the fall of Richard Cromwell that he became a political leader.

In 1659 he spent some time in futile negotiations with the leaders of the army, and on Jan. 2, just after the restoration of the Long Parliament, he entered England. Lambert's rival army having dispersed, he marched



George Monk,
1st Duke of Albemarle

unmolested to London. When, on Feb. 3, Monk entered the city, he had under him the only effective and disciplined force in the country, and his position was that of dictator. He restored the members excluded from the Long Parliament in 1648, and then, having been made commander-in-chief in England, Scotland, and Ireland, declared for the restoration of Charles II.

In 1660, the returned king made his benefactor duke of Albemarle and heaped other honours upon him. In 1664 Monk again held a naval command, which he gave up to look after London during the Plague. In June, 1666, he was one of the commanders of the fleet in the battle with the Dutch in the Downs. He died Jan. 3, 1670, and was buried in Westminster Abbey. About 1652 he had married Anne Clarges.

His son Christopher, who succeeded to the dukedom, was known previously as earl of Torrington. In 1675 he was made lord-lieutenant of Devonshire and he succeeded Monmouth in command of the Horse Guards, being active in raising men to serve against that invader in 1685. He was chancellor of the university of Cambridge, and was governor of Jamaica when he died in 1688.

Bibliography. Lives: T. Gumble, 1671; Julian S. Corbett, 1889; O. Warner, 1936; Honest George Monck, J. D. G. Davies, 1936; Christopher Monck, 2nd Duke of Albemarle, E. F. Ward, 1915.

Albemarle Sound. Shallow inlet on the N.E. coast of North Carolina, U.S.A. About 60 m. long, with a breadth of from 4 m. to 16 m., it is generally unnavigable except where dredged.

Albemarle Street. London thoroughfare running N. from Piccadilly to Grafton Street. It owes its name to George Monk, 1st duke of Albemarle, who had a residence here, Clarendon House, demolished about 1683. The street contains shops and clubs, but its most interesting buildings are No. 50, the publishing house of John Murray, famous for its associations with Lord Byron; the house of the Royal Asiatic Society; and that of the Royal Institution.

Albendorf. Village of Silesia. On the Cedron, 50 m. S.S.W. of Breslau (Wrocław), it was famous as a place of pilgrimage from 1200. It has a beautiful 18th century church on the model of the temple at Jerusalem, a Calvary, and an image of the Virgin. Before the First Great War this place, with fewer than 2,000 inhabitants, was visited yearly by about 100,000 pilgrims. It is in the part of Germany placed under Polish administration in 1945.

Albenga. Town and seaport of Italy, in the prov. of Savona. The seat of a bishop, it is on the Gulf of Genoa, 52 m. by rly. S.W. of Genoa. On the site of the ancient Albingaunum, chief town of the Ligurian tribe of the Ingauni, it was rebuilt by Constantius in 354. Containing a Gothic cathedral and ruins of medieval châteaux, with Roman remains in the vicinity, it is perhaps the most picturesque town on the Riviera. Pop. 6,882.

Alberche. River of Central Spain. Rising N. of the Sierra de Gredos, it flows about 150 m. E. and S.W. to the Tagus near Talavera.

Alberni. Town and port of Vancouver Island, Canada. It stands at the head of the Alberni

Canal, 58 m. W.N.W. of Nanaimo, and is the terminus of branches of the C.P.R. and the C.N.R. to Victoria. From here steamers go to Victoria and elsewhere. Its industries are connected with lumbering, sawmills, and fish curing. Pop. 2,054.

Alberoni, GIULIO (1664-1752). Italian prelate and Spanish statesman. Born at Firenzuola, near Piacenza, of humble parents, he



Giulio Alberoni

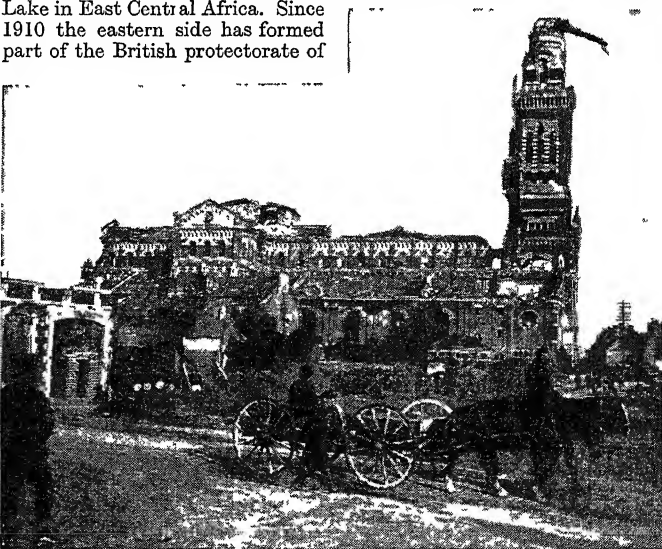
was ordained and became secretary to the duke of Vendôme. After varied diplomatic experiences he was in 1713 sent by the duke of Parma to Madrid. He negotiated the marriage of Philip V with Elizabeth Farnese in 1714, and in the same year became prime minister, being made a cardinal in 1717. He did much to revive Spanish commerce and to organize the Spanish army and navy, but found little favour with the nobles. His aggressive foreign policy resulted in 1719 in the Quadruple Alliance between England, France, Austria, and Holland, and his banishment from Spain. He died at Piacenza, June 16, 1752.

Albert. River of N. Queensland. It is formed by the junction of the Nicholson and Gregory rivers and flows past Burke Town to the Gulf of Carpentaria.

ALBERT OR ALBERT NYANZA. Lake in East Central Africa. Since 1910 the eastern side has formed part of the British protectorate of

Uganda, the western side being attached to the Belgian Congo. It is about 80 m. N.W. of the Victoria Nyanza. It is 100 m. long and 25 m. broad, has an area of 1,650 sq. m., and is situated 2,028 ft. above sea level, but 1,000 ft. below the general level of the surrounding country. The Victoria Nile empties into the N.E. corner and the White Nile issues from its N. extremity. At its S.W. end it receives the Semliki, the outlet of Lake Edward. The Albert Nyanza is shallow, the average depth being 30 to 40 ft., and is likely to become more so through the heavy alluvial deposits of the two tributary rivers. The situation of the lake was first announced by Speke and Grant in 1862, but it was first visited by Sir Samuel Baker in 1864. Steamers run between Butiaba, Mahagi, Wadelai, and Dufilé.

Albert. Town of France, in the department of Somme. It stands on the Ancre, 18 m. N.E. of Amiens and 11 m. S.W. of Baupême, and has paper, cotton, and other industries. Formerly known as Ancre, it received its present name on its presentation to Charles d'Albert, duke of Luynes, by Louis XIII. The church of Notre Dame de Brebières became famous during the First Great War for its so-called hanging Virgin, a gilded figure of the Madonna and Child, which fell into a position 15 degrees below the horizontal during the early operations and remained thus until March, 1918, when it fell. In Oct., 1914, the German lines were drawn 2 m. E. of the town.



Albert. The cathedral as damaged early in the First Great War, showing the hanging statue of the Virgin. It was later restored

which was occupied March 27, 1918, and recaptured in ruins by the Allies Aug. 22, 1918. In the Second Great War the restored town was under German control from June, 1940, until liberated by the Allies at the end of Aug., 1944. Pop. (pre-war) 7,345.

Albert, BATTLE OF. Fought between the French and the Germans, Sept. 20–30, 1914. Towards the close of the first battle of the Aisne (*q.v.*) part of the 2nd French army under Castelnau was moved from Lorraine to the extreme Allied left on the Oise, and with several Territorial divisions was formed into the 7th army. On Sept. 20 it began operations against the flank of the German forces and Kluck's army, and at first made rapid progress. The Germans were also moving men to this flank, having probably been informed of the French intentions by their secret service, but they were not as yet ready to meet Castelnau. He captured Noyon on Sept. 21 and pressed forward towards the important rly. junction of Tergnier, W. of La Fère, while other sections of his army reached Lassigny, Roye, Péronne, and Bapaume.

On Sept. 25, however, troops of Prince Rupert's army (6th) arrived from Lorraine and attacked on a wide front from Noyon to Péronne. Probably because of the shortage of ammunition, which hampered the French artillery all through the earlier period of the war, and because of the superiority of their numbers and their communications, the Germans were able to force Castelnau back after a prolonged struggle. On Sept. 26 he held a line from Ribécourt through Roye, Lihons, W. of Chaulnes, Bray, and the high ground E. of Albert, and here again he was attacked. The Germans hoped to turn the French flank and thus compel Joffre to retire from the Aisne, while Joffre was seeking to force back the German armies by exactly the same manoeuvre.

Albert was bombarded by the German artillery from the high ground of Thiepval and what was afterwards the Somme battlefield. At Lihons, Castelnau's centre inflicted heavy loss on the Germans, but could not gain ground or recover Péronne. At Roye a dangerous salient was driven into the French front.

To meet the growing strength of Prince Rupert's forces, now augmented with the arrival of most of Bulow's army, Joffre

brought up a new French army, the 10th, under Gen. Maud'huy, which came into line N. of Albert, prolonging the Allied front N. as far as Arras. Castelnau's army became the pivot on which Joffre endeavoured to swing his forces inward against the German communications, and as troops were constantly diverted to the exposed flank by both combatants, the front from Albert to Noyon was entrenched by both. There was no substantial change on this section of the line until the German retreat of 1917, after the Somme.

H. W. Wilson

Albert. English form of a popular masculine Christian name. In German it is Albrecht. It is of Teutonic origin and comes from two words meaning noble and bright. Early forms were Adelbert and Adelbrecht in Germany and Ethelbert in Anglo-Saxon England. In England it was not much used after the Norman Conquest, but in Germany it was very common and, in the form of Albrecht, was borne by many kings and princes. After Albert of Saxe-Coburg married Queen Victoria it became, in this form, popular in England. The same form is used in France. The feminine equivalent is Alberta.

Albert, known also as THE PRINCE CONSORT (1819–61). Husband of Queen Victoria and father of her successor, Edward VII. He was the younger son of Ernest, duke of Saxe-Coburg-Gotha, and was born at Schloss Rosenau, near Coburg, August 26, 1819—three months after the princess Victoria, who succeeded to the throne of Great Britain in 1837—being christened Francis Charles Augustus Albert Emanuel. Necessities of state demanded that the young queen should marry, and Albert appeared to be a suitable candidate for her hand. They were married on Feb. 10, 1840.

As the prince consort—a title conferred on him in 1857—Prince Albert occupied a somewhat anomalous position, having no status in the constitution; at the same time he soon became the queen's most intimate personal counsellor. But his influence over her was used with discretion and moderation. He learnt to adapt himself and his advice to English constitutional conditions, although at first he was suspected of encouraging in his wife continental ideas of the functions of royalty. His knowledge of continental politics was exceptionally thorough, and this greatly enhanced the value of his coun-



Albert

sels. Under other conditions he might well have taken high rank as a statesman, but his statesmanship could be displayed only indirectly. Prince Albert, however, had received a model education: he had been taught everything that a prince ought to be taught; he was interested in everything in which a prince ought to be interested. Music, painting, letters, science, industries and social improvement all came within the sphere of his versatile activities, or at least of his intelligent patronage; and he was a prime mover in the organization of the Great Exhibition of 1851. The prince died of typhoid fever at Windsor Castle, Dec. 14, 1861, and was mourned by Queen Victoria for the rest of her long life. *Consult* Life, Sir T. Martin, 5 vols., 1875–80; Letters of Queen Victoria, 1837–61, ed. A. C. Benson and Viscount Esher, 3 vols., 1907. The prince is also treated in considerable detail and with some sympathy in Queen Victoria, Lytton Strachey, 1921.

Albert (1875–1934). King of the Belgians. Born at Brussels, April 8, 1875, he was the second son of Philip, count of Flanders, a younger brother of the Belgian king, Leopold II. He was educated for the throne and after his father's death in 1905 was known as the count of Flanders. He passed some time in travelling, visiting the U.S.A. and the Belgian Congo, as well as regions nearer home. In Dec., 1909 he became king of the Belgians on the death of Leopold. He had ruled his country successfully for nearly five years when he and his government were presented, in Aug., 1914, with Germany's ultimatum. They decided to maintain the

neutrality of Belgium and at once their country was invaded and quickly overrun. The king bore these misfortunes with a dignity that won for him the respect of Europe. Both his sons were sent to England to be educated, his Government was removed to Le Havre, and he himself took his place as commander of his army in the field. In Sept., 1918, he took command of an Allied army—containing Belgian, British and French troops—which recaptured the Belgian coast by Oct. 20.

After the Allied victory the king re-entered Brussels in triumph on Nov. 22, 1918. Thereafter he devoted himself to the rebuilding of his country's economic and social life. His broad human sympathies had a



Albert

marked influence on Belgian culture. He was keenly interested in the development of aeronautics. But it was his great fondness for mountaineering and rock-climbing that led to his death. While climbing a crag in the Ardennes, Feb. 17, 1934, he slipped and was fatally injured. He was succeeded by his eldest son, the duke of Brabant, who became Leopold III (*q.v.*).

Albert had married in 1900 Elizabeth, daughter of the duke Charles Theodore of Bavaria. They had three children, Leopold (b. 1901), Charles (b. 1903), and Marie José (b. 1906; m. the crown prince of Italy, 1930).

Albert I (c. 1250–1308). German king. Eldest son of Rudolph I of Hapsburg, he passed his early days in governing his hereditary lands on the Rhine. In 1292 he swore allegiance to King Adolf of Nassau, but in 1298 defeated him at Göllheim and was himself

elected and crowned as his successor. He failed in efforts to annex Holland and Zeeland to Germany and was defeated in an attack on Thuringia, but he suppressed the league against him. He was murdered at Windisch, May 1, 1308, by his nephew John of Swabia.

Albert (1414–86). Elector of Brandenburg, who was surnamed Achilles. The younger son of the elector Frederick I of Hohen-zollern, in 1440 he succeeded to the principality of Ansbach, in 1464 became prince of Bayreuth by the death of his brother John, and in 1470 elector of Brandenburg by the abdication of his brother Frederick II. Two years later he added Pomerania to his dominions. A powerful warrior and ruler, by his issue of the so-called Dispositio Achillea in 1473 he established primogeniture for the mark of Brandenburg. He died at Frankfurt, March 11, 1486.

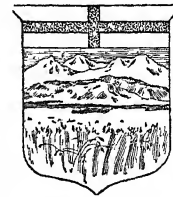
Albert (1522–57). Margrave of Brandenburg-Kulmbach. Belonging to the Hohenzollern family, and surnamed Alcibiades, he was born at Ansbach, March 28, 1522. After fighting for Charles V, he joined Maurice of Saxony against Charles, but later returned to the emperor's service. In July, 1553, he was defeated by Maurice at Sievershausen, and in Dec., 1553, was placed under the imperial ban and fled to France. He died at Pforzheim, Jan. 8, 1557.

Albert (1490–1545). German prelate. The younger son of John Cicero, elector of Brandenburg, he was made archbishop of Magdeburg in 1513. In 1514 he secured the archbishopric of Mainz, one of the seven electorates of the empire, and in 1518 was made a cardinal.

Albert (1490–1568). Duke of Prussia. The third son of Frederick of Hohenzollern he was elected grand-master of the Teutonic order in 1511. Having failed in his attempt to relieve the order from the suzerainty of Poland, he turned Lutheran, secularised Prussia, and in 1525 had it converted into a duchy hereditary in his family and still subject to Poland. This cost him his grand-mastership, but was important for the development of the Prussian monarchy. In 1544 he founded the university of Königsberg. He died at Tapiau, March 20, 1568.

Alberta. Province of the Dominion of Canada. Originally one of the four districts of the North-West Territory, it received its present status in 1905, including about half the former district

of Athabaska and small portions of Assiniboia and Saskatchewan.



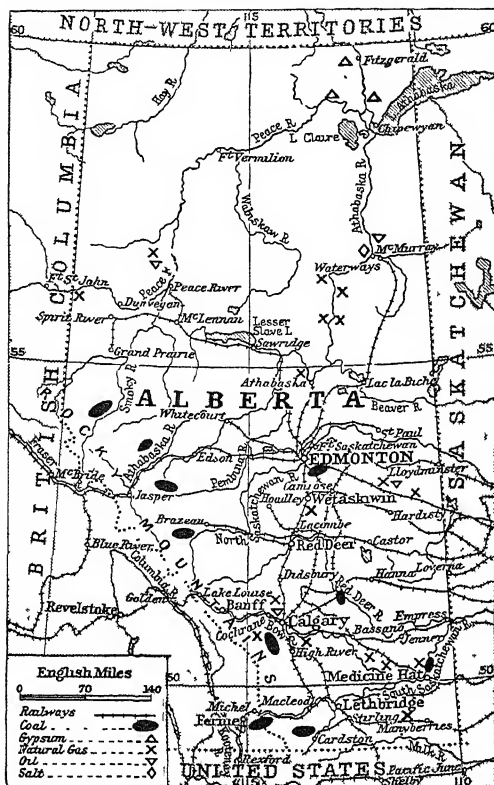
Alberta. Arms of the province

W. by the Rocky Mts. and British Columbia. The length from N. to S. is 760 m., the mean breadth from E. to W. 255 m., and the area 255,285 sq. m.

Three large river systems, the Saskatchewan, Athabaska, and Peace, with their tributaries, traverse the plains. The lakes, though covering 6,485 sq. m., are insignificant apart from Athabaska and Lesser Slave. The climate, influenced by warm chinook winds from the Pacific, exhibits great seasonal variation, for summer temperatures exceed 90° F. in the S.E. and winter temperatures range from 40° F. above to 30° F. below zero. Rainfall is scanty except in the centre, and irrigation has been necessary in the S., much of which is treeless prairie. N. of this is a region of grassland with poplar woods, and farther N. again are larch, spruce, and cottonwood, the area under forest being 159,000 sq. m. The national parks include 8,000 sq. m. of forest, that of Jasper being the biggest in the world.

In the 19th century Alberta consisted of a vast ranching country. Now, though horse-breeding is still profitable, agriculture is the chief industry, and of a population of 796,169 in 1941, 489,583 lived on farms. Four-fifths of the non-forested land is classified as patient of agricultural development, but only a quarter is already cultivated. Wheat and oats are the principal crops.

Manufactures and minerals are of increasing importance. Alberta's coal reserves total 87 per cent of those of Canada and 14 per cent of the world's. The province is the second largest oil producer in the British Empire; nearly 10 million barrels came from the gas in Turner Valley in 1941, while the McMurray area contains the largest visible supply of bituminous sand in the world. At Waterways are salt deposits expected to yield 500,000 tons to the acre. Packing plant production was valued at \$67,200,000 in 1943. There are 5,818 m. of



Alberta, one of the prairie provinces of the Dominion of Canada. It was constituted in 1905

riety, operated by the C.P.R., and seven municipal airports, Edmonton ranking as one of the chief commercial airports in the Empire. A flourishing tourist industry is forecast by the development of huge holiday resorts in the Rockies, as at Banff, and of the parks. The unspoiled country includes several Indian reservations.

The population of the seven cities in 1941 was as follows: Edmonton, the capital, 93,817; Calgary, 88,904; Lethbridge, 14,612; Medicine Hat, 10,571; Red Deer, 2,924; Drumheller, 2,748; Wetaskiwin, 2,318. The 60 municipal districts are organized to cover as nearly as possible the area of nine townships apiece, i.e. roughly 18 m. square, and are governed by elected councils. The provincial executive is vested in a lieutenant-governor appointed by the federal government and in a cabinet selected from the legislature. An assembly of 57 is chosen by the direct vote of both sexes. Alberta sends 6 senators and 17 members of the house of commons to the Canadian parliament at Ottawa.

at Edmonton; this is coeducational, and has extension courses and a summer school. *See Social Credit. Consult History of Alberta, J. Blue, 1924; The Alberta Experiment, C. H. Douglas, 1937.*

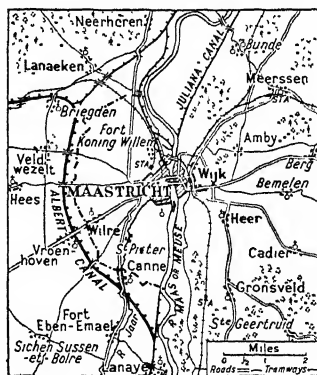
Albert Canal. Belgian inland waterway, constructed 1930-39, at a cost of £8,300,000. Nearly 79 m. long, it runs from Liège to Antwerp, supplanting to a great extent an older canal taking a circuitous route and unsuitable for modern requirements. The Albert canal has six locks with double chambers of 150 yards by 17 yards, one chamber at each lock being divided into two compartments by intermediate gates. Vessels of up to 2,000 tons can now reach Liège in two days from Antwerp, whereas previously the journey took more than a week. The canal forms a direct link between the Limburg-Liège industrial basin and the port of Antwerp, and merchandise shipped at points on the Meuse reaches the Scheldt without leaving Belgian territory. At many points the canal is above sea level, and protective dykes and embankments have been built.

Since 1936 the Social Credit government has achieved an average yearly reduction of almost \$2,500,000 in the provincial debt. Cooperation is encouraged by laws relating to finance, marketing, and housing; while genuine private enterprise is welcomed, monopoly in any field is precluded. Alberta claims that its labour legislation is the most progressive in the Dominion, and its acts regulating wages and hours have been widely studied. There is a supreme court with judges appointed for life from Ottawa. Schools are supported by government grants and local taxes, and pupils numbered 151,985 in 1944. The university of Alberta (1908) is

Apart from its economic importance, the canal was also designed to be an integral part of Belgian frontier defence, particularly in closing the Maastricht gap with what should have been a formidable obstacle to tanks. But in the event two vital bridges were seized intact by the German parachutists on the first day of the German invasion, May 10, 1940, and an immediate withdrawal to the Antwerp-Namur line was inevitable.

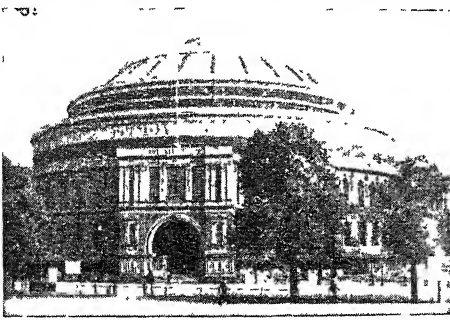
Albert Embankment. London thoroughfare. On the E. or right side of the Thames, which here flows N., it runs from Vauxhall to Westminster Bridge, being a mile long. The Houses of Parliament look across the river to its N. end. The embankment was completed in 1869 and named after the Prince Consort.

Albert Hall, ROYAL. Building in South Kensington. It was completed in 1871, and, with the Albert Memorial in Kensington Gardens, was dedicated to the memory of Albert, Prince Consort. It was designed by Captain Fowke, R.E., but after his death was almost entirely re-designed by Sir Gilbert Scott, though Captain Fowke's original scheme of corridors and stairways was preserved. It is nearly a true ellipse in plan with an exterior in the Italian Renaissance style, the façade being of red brick and terra-cotta. The front porch, facing the Albert Memorial, and the side porches are composed of huge arches spanning the carriage drive and supporting a storey above. The auditorium was designed to contain 8,000 persons, not including performers, for whom provision is made in the orchestra, which will accommodate 1,000 singers and 200 instrumentalists. Internally



Albert Canal. The stretch near Maastricht, on the Netherland-Belgian frontier

the hall measures 219 ft. by 185 ft., while the distance from the floor to the central roof is 136 ft. The centre floor-space, or arena, is reached by six staircases, and is 102 ft. long by 68 ft. The hall is chiefly used for concerts, displays, and public meetings, and its organ is one of the largest in the world. The acoustics were



Albert Hall, London, completed in 1871, from the designs of Captain Fowke, R.E., and Sir Gilbert Scott

long marred by a persistent echo. But considerable improvements were made in this respect when the Promenade concerts (*q.v.*) were transferred there in 1941, after the destruction of Queen's Hall by enemy action had left the Albert Hall the only large concert hall in London. The Albert Hall itself suffered minor damage from bomb blast in Feb., 1944.

Alberti, CHERUBINO OR BORGHEGGIANO (1553-1615). Italian painter and engraver. Born at Borgo San Sepolcro, in Tuscany, his fame rests upon his line engravings, nearly 180 in number. Several fine friezes by Caravaggio are known only through Alberti's prints.

Alberti, LEON BATTISTA DEGLI (1404-72). Italian scholar and artist. Born at Venice, Feb. 18, 1404, he was the illegitimate son of a Florentine. In 1432 he entered the service of Pope Eugenius IV, and remained in that of five of his successors, at Florence or at Rome, until his death in April, 1472. A leading figure in the artistic and intellectual circle of his time, he was famed also as a musician and architect. His writings include *De Re Aedificatoria*, 1485, the first large printed book on architecture, and a treatise on painting.

Albert Medal. British decoration instituted by Queen Victoria in 1866 for distinguished acts of bravery in life-saving at sea, and extended in 1877 to mark similar acts on land. The rules of the award were amended in 1905. Each of the two classes is in two divisions. The badge is oval, in gold for the 1st class and bronze for the 2nd, with



Albert Medal
Courtesy of
Geo. Philip & Sons

the monogram V.A.; that for sea service has an anchor interlaced with the monogram. The ribbon is crimson and white.

Albert Memorial. Elaborate canopied monument, erected in Kensington Gardens, London, in memory of Albert, Prince Consort. Finished in 1872 and unveiled March 9, 1876, it is 150 ft. high, the gilded statue of the prince being by J. H. Foley. The whole, which is richly embellished with statuettes in high relief representing painters, sculptors, and musicians, was designed by Sir Gilbert Scott.

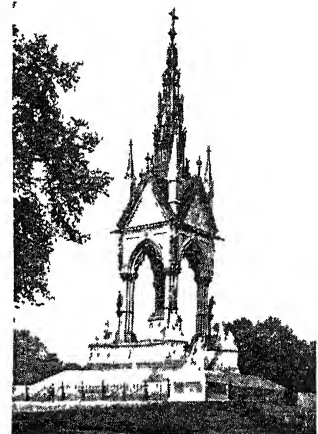
Albertus Magnus (c. 1205-80). Scientist, philosopher, and theologian. Called the Great, he was born of a noble family at Lauingen, Swabia. He studied at Padua, joined the Dominican order of friars in 1223, taught theology at Hildesheim, Ratisbon, Cologne, and Paris, where Thomas Aquinas was one of his pupils, and in 1254 was elected provincial of the Dominicans in Germany. In 1260 he was made bishop of Ratisbon, but resigned two years later and returned to his studies at Cologne. He took part in the Council of Lyons, 1274. Beatified, but not fully canonised as a saint, by Pope Gregory XV in 1622, his festival is kept on Nov. 15.

Albertus Magnus was, with the possible exception of Roger Bacon, the greatest scientist, philosopher, and theologian of his time. Hence the title universal doctor bestowed upon him. In the development of physical science, notably physical geography, botany, astronomy, and mineralogy; in calling attention to the importance of Aristotle's teaching; and in shaping the form of Christian philosophy and theology he exercised a lasting influence. His works, 21 folio vols., were published in 1651 at Lyons and in Paris, 1899-1900. *See* Scholasticism.

Albertville. Settlement in the Belgian Congo, on the W. shore of Lake Tanganyika. It is the terminus of a rly. from the river Lualaba to Lake Tanganyika, thus giving communication by rly. and water from the mouth of the Congo, on the W. African coast, to Dar-es-Salaam, on the E. littoral.

Albery, JAMES (1833-1889). British playwright. Born in London, May 4, 1838, he wrote and adapted many plays for the London stage between 1866 and 1880. The comedy *Two Roses*, in which Irving appeared (1870), was his most conspicuous success. In 1878 he married Mary Moore (*q.v.*), who was at that time leading lady at the Criterion theatre, where Albery was retained as a stock writer. He died Aug. 15, 1889. A son, Bronson James Albery (b. 1881), became a well-known London theatrical manager, knighted 1949.

Albi. City of France. The capital of Tarn department, it is on the Tarn, 44 m. by rly. N.E. of



Albert Memorial, Kensington Gardens, London, designed by Sir Gilbert Scott

Toulouse. The seat of an archbishop, it has a cathedral dating from the 13th century and a 14th century archiepiscopal palace. It manufactures textiles and trades in wine, grain, and fruit. The city suffered much in the wars against the Albigenes, who took their name from it. Pop. 29,351.

Albian. The name of deposits that lie immediately beneath the Cenomanian or lower chalk. They are represented in Britain by lower greensand and gault.

Albigenses. Name given to a religious sect which flourished in the S. of France in the 11th-13th centuries. Derived from the town

of Albi, one of their centres, it was first used about 1180 or some 150 years after their first appearance. Their beliefs were akin to those of the Cathars, the Bogomils, the Paulicians, and other sects of the E of Europe, whence they were introduced into France. These beliefs, in brief, were that man and matter were wholly evil, that Jesus Christ never existed save in the spirit, that marriage was to be deprecated, and that only by abstinence and self denial could men free themselves from the evils inherent in their bodies. Their leaders were the Cathari (pure) or Perfecti, called also the Bons hommes, who practised a rigorous asceticism which their followers were not called upon to emulate. On the political side the Albigenses were deliberately opposed to the whole system of the Church of Rome and to the faith and morals of Christendom.

The doctrines of the Albigenses spread rapidly, especially in Aquitaine, where the powerful ruler, Duke William IX, befriended them. Several councils of the Church condemned their practices and doctrines, and as early as 1022 certain of them were put to death. But the people favoured them, and many of the feudal nobles, anxious to be free of the authority of the Church, were on their side. Preachers, including St Bernard of Clairvaux, and papal legates were sent to convert them, but failed to arrest the growth of the heresy. With Pope Innocent III began the last and most tragic chapter of their history. Peaceful argument having failed a crusade was preached by the Cistercians, and under Simon de Montfort a war, or rather massacre, began. It raged from 1209-29, and in addition to being a merciless religious war was an effort to crush the independent tendencies of the nobles of S France. In both aims it succeeded. The Albigenses were scattered and reduced, the land was made a desert, and the counts were shorn of power. In several towns the Inquisition was set up, and its officers spared neither time nor effort in hunting down their victims. In 1245 the stronghold, Mont Segur, was captured, and a century later the Albigenses no longer existed. See Facts and Doctrines illustrative of the Albigenses and Waldenses, S R Matland, 1832, Innocent III la Croisade des Albigeois, A Luchaire, 1905.

Albinism (Lat *albus*, white) Absence of the natural pigment of the skin, hair, and coating of the eye. The phenomenon occurs

in the human species, more noticeably among negroes and is found in many usually coloured animals. The hair of a true albino is white, the skin transparent, and the eyes generally appear pink, the iris being colourless and transparent, thus allowing the red blood vessels to be vaguely seen through it and rendering the eye abnormally sensitive to light. A kind of albinism is seen in the periodic assumption of white by animals in the northern regions in winter. The Arctic fox and hare and the



Albinism. A lack of natural pigment is particularly noticeable in negro races as in this Basuto boy.

ptarmigan are examples. The albinism of white mice tends to become hereditary and is fostered by selection in breeding.

Albion Ancient name of the British Isles. It is possibly of Celtic origin, and was connected by the Romans with *albus*, white, from the colour of the Dover cliffs.

Albite (Lat *albus* white) Plagioclase feldspar, sodium aluminum silicate. It occurs both as a primary and secondary constituent of igneous rocks and is prevalent in the crystalline schists.

Albo-carbon Name applied to naphthalene, $C_{10}H_8$ from its use in the albo carbon system of enriching illuminating gas. The substance is often known as carbon, and under this designation it is employed for preserving furs and woollen goods from moth.

Alboin (d 572 or 573) Lombard conqueror of Italy. He became king of the Lombards in Pannonia about 565, and after helping to subdue the Ostrogoths joined forces with the Avars against the Gepidae, who were totally defeated. Alboin slew the Gepid king Cunimund and married his daughter Rosamund. In 568 he invaded Italy and subdued most of the northern part of the country, making Pavia, after a three years' siege, his capital. He was assassinated in 572 or 573 at the instance of Rosamund, whom he had forced at a banquet to drink

out of a wine cup made from her father's skull. A great ruler and the founder of the Lombard dominions in Italy the name and fame of Alboin were long celebrated in song and story.

Albona (Croat Labin) Town of Yugoslavia. It is on the E side of the Istrian peninsula 41 m S E of Trieste, in the neighbourhood of lignite mines. Once Austrian, and then from 1919 Italian. Albona became predominantly Italian in pop. It is in the area ceded to Yugoslavia by Italy in 1947. See Istria.

Albornoz, GIL ALVAREZ CARILLO (1300-67) A Spanish soldier and prelate. He was born at Cuenca, Spain, and became archbishop of Toledo. He took part in the fighting against the Moors, and for saving the life of Alfonso XI of Castile was made a knight. Created cardinal by Clement VI at Avignon, and sent as legate to Rome by Innocent VII, he died at Viterbo after being appointed papal legate at Bologna.

Albret Notable French family which had extensive lands in the S of France. In 1415 Charles d'Albret, constable of France, was killed at the battle of Agincourt, and a century later Alain d'Albret revolted against Charles VIII. Alain's son, John, married Catherine of Foix and became king of Navarre, and their son Henry was made a duke of France in 1550. Henry married Margaret, a sister of King Francis I, and their daughter Jeanne (1528-72) was historically the most important member of this family. On her father's death she became queen of Navarre, and by her marriage with Antony of Bourbon mother of Henry IV, to whom her kingdom passed. Jeanne, a zealous Calvinist, was a leader of the Huguenots during the civil wars of religion in France.

Albrizzi, ISABELLA TFOCCHI, COUNTESS D' (c 1761-1836) Italian writer. Born at Corfu of an ancient Greek family, she married in 1776 as her first husband, Carlo Antonio, a Venetian nobleman. From him she was divorced in July, 1795 and on March 25, 1796, she married Count Giuseppe Albrizzi, the official inquisitor Morelli, Alfieri, Ugo Foscolo, and Byron frequented her salon in Venice. Her second husband died in 1812, but she survived until Sept 27, 1836. Her best known works are *Ritratti di Uomini Illustri* a series of line portraits of distinguished men with descriptive letterpress, and *Opere di Scultura e di Plastica* di Canova, Florence, 1809. Her early

appreciation of Canova's work helped very considerably to win recognition for his genius

Albrun Pass Alpine route between Switzerland and Italy. It leads up the Binn valley in the canton of Valais, down the D'Avro glen to Baceno N of Domo d'Ossola. It rises to 7,907 ft

Albuera, BATTLE or British victory in the Peninsular War. It was fought on May 16, 1811. The French, about 23,000 strong, under Marshal Soult, were marching to relieve Badajoz, then besieged by the British. Wellington ordered Beresford to raise the siege and intercept the advancing enemy, the village of Albuera, 13 m SE of Badajoz, being selected as the place of meeting. On the 14th the allied troops began to assemble on a ridge overlooking the village, and by the morning of the 16th over 30,000 were in position, only about 6,000 being British, the rest Spaniards and Portuguese.

Early on the 16th Soult sent a column to cross the little stream Albuera and assail the allied left. This however was a feint. The main French attack was directed against the right flank of the Allies. Beresford was expecting a frontal assault and before he could wheel his men to the right the enemy was upon them and the fight for the hill began. The British 2nd division was brought from the other side of the battlefield to the aid of the Spaniards who had met the first shock of the French, but its first brigade was almost destroyed by fire, coupled with a charge of the enemy's cavalry upon its rear. Another brigade followed up, however, and it was during this stage of the struggle that the 57th (Middlesex) regiment earned their name of the Die Hards, for their colonel, when badly wounded, called to them to 'die hard'. Out of 575 combatants they lost 423, and the Buffs suffered almost as heavily,

the musket fire of the French soldiers only a few yards away, causing most of the casualties.

The confusion was terrible. Neither side had room to deploy. Beresford narrowly escaped death or capture and, becoming unnerved, rode away and prepared for a retreat. The day was saved by Colonel Hardinge, afterwards Lord Hardinge, who ordered up the last reserves, British and Portuguese. The latter were told off to watch the French horsemen, while three battalions of Fusiliers, two of the 7th (Royal) and one of the 23rd (Royal Welsh) advanced up the hill. In describing their deeds as they went steadily forward, indifferent alike to the death in front and the disorder around, Napier writes in one of his most memorable passages: 'Then was seen with what a strength and majesty the British soldier fights,' and when it was all over only 1,500 un wounded men, the remnant of 6,000 unconquerable



Centre: Marshal Beresford is being attacked by a fallen Polish lancer, while others advance from the left. In the centre background British troops are driving the enemy up the hill, and a little farther to the right the attack on Albuera bridge is depicted. In front of the bridge are the 57th Foot (Middlesex Regt.) who gained their greatest battle honour here, May 16, 1811.

ALBUERA EPISODES IN THE COURSE OF THIS CRITICAL BATTLE OF THE PENINSULAR WAR

From a print published in July 1811 in the Crookshank Military Prints Collection, British Museum.

British soldiers, stood triumphant on the fatal hill." The French got away in fairly good order across the Albuera, taking with them 500 prisoners. The combat lasted for seven hours, during which time over 8,000 French and some 7,000 Allies fell. See *Peninsular War*. W. F. P. Napier, Vol. III, 1836.

Albufera. Lake in Spain, 7 m. S. of Valencia. It is 12 m. long and 4 m. broad, communicates with the Mediterranean by sluices, and is connected by canal with Valencia. It is rich in fish and water-fowl.

Albula. Pass in Switzerland from Bergün, in the valley of the Albula, to Ponte on the Inn (upper Engadine). It is in the canton of Grisons, and its highest point is 7,595 ft. A good carriage road was made across it in 1865, and a rly. tunnel was pierced below it in 1898-1903. The Albula river rises in the pass and flows into the Hinterrhine below the Via Mala.

Album. General name for books of blank leaves on which can be written, drawn, or pasted autographs, verses, or sketches. There are also special kinds for keeping photographs, picture postcards, postage stamps, or press-cuttings. In ancient Rome albums were whitened boards on which were inscribed public notices and lists of officials. In the first half of the 19th century many illustrated miscellanies were published under the general title of albums, e.g. *The Keepsake*, *Forget-me-not*, *Friendship's Offering*.

Albumin and ALBUMEN (Lat. *albus*, white). Important subgroup in the class of nitrogenous constituents of both plants and animals known as proteins. To-day albumins are classed as simple proteins. The term albumen is now generally restricted to white of egg and the chemical expression albumin to its chief constituent.

Albumin is a complex carbon compound, which occurs only in living bodies and is essential to both plant and animal life. So far all attempts to prepare albumin synthetically have failed. The various kinds are as follows:

Of Animal Origin: Ovalbumin or egg-albumin; serum albumin or blood albumin; lactalbumin from milk; myosinogen from striated muscular tissue.

Of Vegetable Origin: Abrin from abrus seeds; legumelin from lentils, horse-beans, and peas; leucosin from wheat; ricin from castor bean.

The distinguishing chemical characteristics of the albumins are that they are soluble in water and are not precipitated from their solutions by magnesium sulphate,

but are precipitated by ammonium sulphate. As is well known in the case of white of egg, albumin under the influence of heat changes into a white insoluble substance known as coagulated albumin. It is to ensure this taking place throughout an egg that the egg is boiled for eating purposes for about four minutes. The white of egg contains about 12 p.c. of albumin and has in its composition 85 p.c. to 88 p.c. of water. White of egg contains lactoflavin (vitamin B2) but no other vitamin is present in significant amount.

For technological purposes albumin is prepared from white of egg by evaporating the liquid to dryness at temperatures below that at which it coagulates. Dried white of egg occurs in the form of translucent pale yellowish scales soluble in eight parts of water. Albumin forms nearly 8 p.c. of the serum of the blood. For technological purposes the blood of animals obtained from slaughterhouses is allowed to clot in shallow zinc pans and the serum is drained away and evaporated. Five oxen yield about 4½ gallons of serum and about 4½ lb. of albumin.

The two albumins described above have similar properties. They are used on a large scale in calico printing for fixing colours in the fabric. The albumin is printed on the calico and coagulated by exposing it to steam. The fabric is then dyed, the colour only attaching itself to those parts where albumin has been printed. Albumin was formerly largely used in sugar refining and in photography.

Lactalbumin is only present in small amounts in cows' milk, and is coagulated by boiling. It forms the "skin" which is noticeable in boiled milk. Casein, the most important protein in milk, is known as a derived albumin. Other derived albumins or albuminates are known as acid albumin and alkali albumin, and are the products of the action of acids and alkalis on albumin. Myosinogen, the albumin of the muscles, is the substance the coagulation of which in a dead body causes the rigid condition known as *rigor mortis*. The vegetable albumins are generally prepared by precipitating aqueous solutions by saturating the liquid with ammonium sulphate, and are of importance in considering the food values of plants.

S. W. WOOLLEY

Albuminoids. Class of substances, as the name signifies, resembling albumin. The modern

name for albuminoids is scleroproteins. They are derived from animal tissues and are chiefly represented by gelatin and horn. These have been conveniently classified as follows: collagens, fibroids, chitinoids, and keratin.

The principal collagens or jelly-forming albuminoids are collagen, chondrigen, and sericin. Collagen is prepared from connective tissues or tendons and bones, that from bones being known as ossein. Both these substances yield gelatin or glue by the action of boiling water. Chondrigen is a body analogous to collagen and is contained in the hyaline cartilage. Sericin or silk-glue is dissolved from silk by hot water. The chief fibroids are elastin, the elastic fibre of connective tissue, and fibroin, contained in silk and spiders' web. The chitinoids are chitin, prepared from crab-shells or the wing-cases of the cockchafer, conchiolin, obtained from the shells of mussels or snails, and spongin, the characteristic substance of sponge. Keratin is contained in hoofs, horns, and similar substances. There are other scleroproteins of minor importance with distinct chemical characteristics.

Albuminuria (Lat. *albumen*; *urina*, urine). Presence of albumin in the urine, most often a sign of disease of the kidneys, bladder, or urethra, but also occurring in fevers and other affections. To test for albumin in the urine, add a few drops of acetic acid to the urine if it is alkaline until it becomes acid, and boil the top of a column of the fluid in a test-tube held obliquely in the flame of a spirit-lamp, finally adding a drop or two more of acetic or nitric acid. A cloudy formation at the top of the urine indicates the presence of albumin. Another test is to pour nitric acid gently on the surface of urine in a test-tube, when, if albumin is present, a white ring will form at the junction of the two fluids. These tests are only reliable when performed by experts.

Albuquerque. Chief city of Bernalillo county, New Mexico, U.S.A. On the Rio Grande, 36 m. S.W. of Santa Fé by the Atchison, Topeka and Santa Fé Rly., it is a rly. centre and the seat of the university of New Mexico. The city contains a large wool-scouring plant and deals with the products of the many ranches of the neighbourhood. It trades in hides, wool, lumber, and fruit, and there are a few small gold, copper, and lead mines in the vicinity. Pop. 35,449. *Pron.* Albú'-kerk.

Albuquerque, AFFONSO D' (1453-1515). Portuguese viceroy of the Indies. He was born of noble parents at Alhandra, near Lisbon. and educated in the royal palace. In 1503 he made his first expedition to the Indies, and established the influence of Portugal in Cochín. Three years later, under Tristan da Cunha, he went again to the East, and made his way to the island of Ormuz in the Persian Gulf. This he seized, but kept only for a short time. In 1507, succeeding Francisco d'Almeida as viceroy of the Indies, he began at once a series of conquests. Goa and Malacca and eventually Ormuz were secured, but an attempt on Aden failed. In 1515 his enemies at the Portuguese court secured his downfall, the king sending out his foe, Soarez, to take his place. Albuquerque died at sea near Goa, Dec. 16, 1515. He was buried at Goa, which has remained in the possession of Portugal to this day. His Commentaries, translated into English, were published by the Hakluyt Society, 1875-84.



Albuquerque,
Portuguese Viceroy

Albury. Town of New South Wales, in Goulburn county. At the head of steam navigation on the river Murray, it is 336 m. by rly: S.W. of Sydney, and is the centre of an extensive agricultural district noted for its sheep (producing what is claimed to be the world's finest merino wool), cereals, and wine. The Hume reservoir, opened Nov. 22, 1936, eighth largest in the world, has greatly contributed to the prosperity of the district. Pop. 12,940.

Albury is also the name of a village of Surrey, England, 4 m. E. of Guildford.

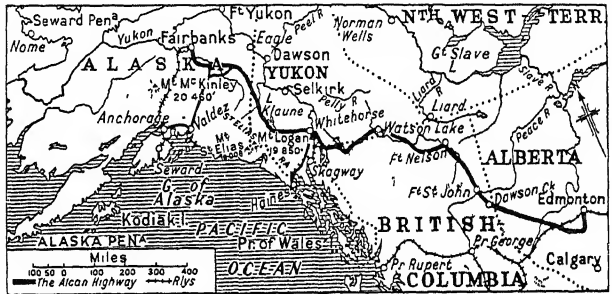
Alcaeus (c. 600 B.C.). Greek lyric poet. A native of Mitylene in Lesbos, and of noble family, he fought on several occasions in defence of the oligarchy to which he belonged, and as a result was banished and went into exile in Egypt. Returning, he took up arms against the tyrant Pittacus, was taken captive, but magnanimously forgiven. The surviving fragments of his political poems are passionate, but manly; his love and drinking songs are characterised by sensuality. He wrote in the Aeolic dialect.

Alcaic Metre. Form of classical lyric poetry said to have been

used first by Alcaeus of Mitylene. It is a favourite with the Roman poet Horace, and is familiar to English readers from Tennyson's imitation in his lines to Milton: O mighty-mouthed inventor of harmonies, O skilled to sing of time or eternity, God-gifted organ-voice of England, Milton, a name to resound for ages.

Alcalá de Henares. Town of Spain, in Madrid province. On the Henares, it is 21 m. by rly. N.E. of Madrid. The Roman Complutum and the Moorish Al-Kalah, it was the birthplace of Cervantes and Catherine of Aragon. At its university, founded by Cardinal Ximenez de Cisneros in 1510, was produced, 1514-17, the great Polyglot Bible or Biblia Complutensis, in Hebrew, Latin, Greek, and Chaldean. Its buildings include the old university, the former palace of the archbishops

Alaska (the name is an abbreviation of Alaska-Canada) it links a road that already ran from the U.S. to Dawson Creek in British Columbia via Calgary and Edmonton, with Fairbanks in Alaska. The route is through Fort St. John and Fort Nelson in British Columbia and Whitehorse in the Yukon. At Fairbanks it joins a network of roads to the Pacific. The length of the road is 1,671 miles; it is 24 ft. wide and its construction involved the bridging of 200 streams. The highway's defence was a joint Canadian-U.S. responsibility. Over 10,000 U.S. army engineers, assisted by 4,000 civilian workers, Canadian and American, were employed in its construction. It was agreed that the U.S. would be responsible for its maintenance for six months after the end of the Second Great War. In



Alcan Highway. Military road, built in 1942, running from Edmonton, Alberta, through British Columbia to Fairbanks in Alaska. It is 1,671 miles in length

of Toledo, the cathedral, and the church of S. Maria, where Cervantes was baptized. Pop. 11,725.

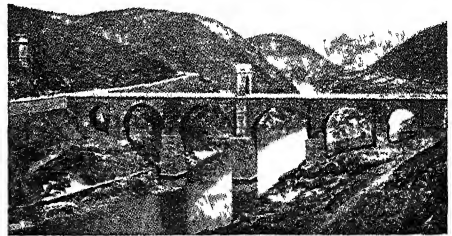
Alcalde (Arabic, *al-qadi*, the judge). Spanish official title for the president of the council of the commune. Usually he is chosen by the members of the council in the larger towns, but he may be appointed by the government. He discharges certain executive and judicial duties, his position being not unlike that of an English mayor. The title is largely used in Spanish America.

Alcan Highway. Begun in mid-March, 1942, and officially opened for wheeled traffic, Nov. 20, 1942, this highway was designed to facilitate the transport of war materials to Alaska, as the spearhead of an Allied attack upon Japan. Connecting the U.S. with

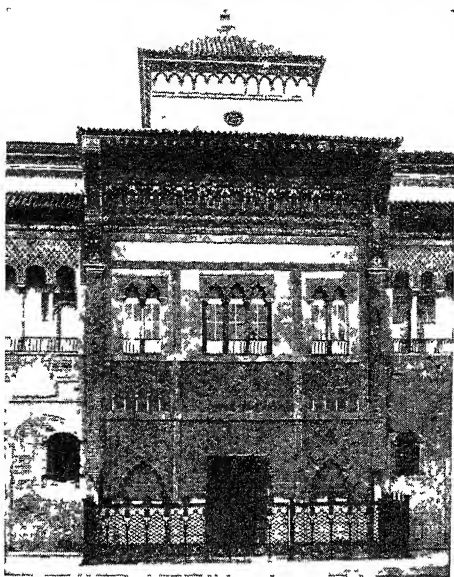
1946 the Canadian government incorporated its section of 1,257 m. into its road system as the North Western Highway.

Alcaniz. Town of Spain, in Teruel province. On the Guadalupe, 65 m. S.E. of Zaragoza (Saragossa), it was the scene of a famous battle, 212 B.C., in which the Carthaginians under Hasdrubal Barca defeated the Romans under Gnaeus and Publius Cornelius Scipio. The town has a medieval castle and the old walls.

Alcántara (Arab. *al-kántarah*, the bridge). Town of Spain, in Cáceres province. On the left bank



Alcántara. Roman bridge over the Tagus built A.D. 105 and still in use. The central arches have each a span of 100 ft.



Alcázar. Main entrance to the 14th century Moorish palace, twice restored, at Seville

of the Tagus, 35 m. N.W. of Cáceres, it is famous for its six-arched Roman bridge, 617 ft. long, 26 ft. wide, with middle piers about 190 ft. high. Built A.D. 105, this bridge was thoroughly restored in 1860. The Gothic church of S. Maria de Almocóbar dates from the 13th century. In 1217 the town gave its name to the order of Alcántara, a Spanish order of knighthood, later reconstituted as a military order.

Alcántara. Seaport of Brazil, in Maranhão state, 16 m. N.W. of Maranhão city.

Alcaraz. Town of Spain, in Albacete province. It is 36 m. W.S.W. of Albacete, with copper, tin, and zinc mines in the vicinity. It manufactures leather, wool, and linen, and is in a good cattle-producing district. Pop. 5,400. The Alcaraz mts., the E. extension of the Sierra Morena, are in Albacete province.

Alcatraz. Island in San Francisco bay. It is 1,650 ft. long and rises to 130 ft. It has a light-house and a long-term U.S. federal prison. On May 2, 1946, the convicts mutinied and, obtaining fire-arms from the armoury, waged a 36-hour battle with 132 marines and warders armed with machine-guns and hand-grenades. Three convicts and two warders were killed before the mutiny was quelled.

Alcázar (Arabic, *al qasr*, the palace). Name applied to various Moorish palaces in Spain. They were built as strongholds, but, in

accordance with the Moorish love of decorative art, their ornamental work and their arcaded courts are a distinguishing feature. Notable examples are the alcázar of Seville, built in the 14th century on the site of a Moorish citadel of 1181, and restored in 1624 and 1857; that of Toledo, captured by Spanish government troops on Sept. 20, 1936, after a fierce resistance of nine weeks by a nationalist garrison; and that of Segovia, built by Alfonso VI of Castile (1072-1109), renewed 1352-58, but almost destroyed by fire in 1862.

Alcázar de San Juan. Town of Ciudad Real province. It is 92 m. by rly. S.E. of Madrid, a junction for the Andalusian rlys., and a centre of the Estremadura, Andalusia, and Alicante wine trade, and manufactures gunpowder, soap, and damascened daggers. Alcázar has associations with Cervantes and Don Quixote. Pop. 16,000.

Alcester. Parish and market town of Warwickshire, England. It lies at the union of the rivers Alne and Arrow, 15 m. S.W. of Warwick by railway. Market day, Wed. Pop. 2,195.

Alcestis. In Greek legend, the wife of Admetus. The Fates, at the request of Apollo, had granted her husband immortality on condition that he procured another

to die in his stead. His aged parents, although they had only a few more years to live, refused, but Alcestis nobly sacrificed herself. In one version Alcestis is said to have been brought back to her husband from the underworld by Hercules. The story is the subject of the drama of the same name by Euripides and of Brown-ing's *Balaustion's Adventure*.

Alchemical Signs. Marks or symbols used by early chemists. The ancient chemists worked in an atmosphere of mystery partly due

Gold		Alum		Oil	
Silver		Nitre		Air	
Copper		Vitriol		Earth	
Iron		Verdigris		Fire	
Quick-silver		Sal Am-moniac		Water	
Lead		Vinegar		Hour	
Antimony		Aqua Fortis		Day	
Sulphur		Quick-lime		Retort	

Alchemical signs or symbols

to the suspicion with which their work was regarded. Probably on this account they invented a kind of shorthand to express the operations in which they were engaged. Down to the end of the 17th century books on chemistry employed these signs in the directions for preparing chemicals and drugs. Some of the symbols are given above. The first column gives the symbols for substances now recognized as elements, gold, silver, copper, and iron being also called Sol, Luna, Venus, and Mars from their dedication to those planets.

ALCHEMY: BIRTH STAGE OF CHEMISTRY

S. G. Blaxland Stubbs, joint author *Sixty Centuries of Physick*

Showing how, from an art dealing with the working and colouring of metals, alchemy concerned itself with the search for medicines and gave rise to the science of chemistry. See Chemistry

Alchemy is a term used for the art of chemistry as practised from ancient times to the middle of the 17th century. It must be distinguished from the science of chemistry, which may be said to have been founded by Robert Boyle (1627-91). The word is derived from the Arabic *al*, the definite article, and *kimiya*, a word of Greek origin, probably not meaning the art itself but the material employed. *Kimiya* may be a form of *chymeia*, infusion, from *chymos*, the sap of trees, which was of

special importance in medieval chemistry as applied to medicine. Its application to the transmutation of metals was probably a later development. Some authorities connect *kimiya* with Egyptian *khem* (black), the name of Egypt as the land of black earth, associated with the idea of the black art.

Roger Bacon, in the *Mirror of Alchemy*, defines alchemy as follows: "Alchemy is a science teaching how to transform any kind of metall into another, and that by proper medicine as it

appears by many philosophers' bookes. Alchemy, therefore, is a science teaching how to make and compound certain medicine which is called elixir, the which when it is cast upon mettalls or imperfect bodies doth fully perfect them in the verie projection." There was, in addition, a philosophical side of alchemy expressed in mystical language.

There seems no doubt that the earliest chemistry had to do with the working and colouring of metals, and that the search for medicines for the body and the applications of alchemy to technical processes were developments of metal working. The Chaldaeans seem to have associated gold, silver, mercury, iron, tin, copper, and lead with the planets (Sun, Moon, Mercury, Mars, Jupiter, Venus, Saturn), and to have held the doctrine that metals were all made of sulphur and mercury in various proportions. The "perfect" metals were gold and silver, but the others could be perfected by "projecting" certain substances, or "medicines," upon them when in a heated state.

The Philosopher's Stone

The "medicine" was called "the philosopher's stone," two varieties of which were postulated: a white one for transmuting metals into silver, and a red one for transmuting them into gold. The philosopher's stone, dissolved in alcohol, and known as *aurum potabile* (drinkable gold), or the elixir of life, when used on the human body, was believed to produce eternal youth. Alchemists also sought for the alcahest or universal solvent, a method of creating living beings and of restoring plants from their ashes.

There was some ground for the belief that transmutation of metals was possible. When a strip of bright iron is immersed in sulphate of copper solution, the iron appears to be converted into copper, owing to the electrolytic deposition of a film of copper on the iron. It would not have been impossible to obtain silver from a lead ore, and as the alchemical processes were essentially methods of purification, a small proportion of silver might have been obtained by them. Similarly pyrites containing gold may have been used to obtain a small amount of that metal. The recipes in the works of alchemists, at least those that are intelligible, produce alloys, which elementary chemical knowledge could not distinguish from the precious metals. The idea of the "multiplication" of gold by alchemical methods is explained

on the same principle. The furnaces and alembics employed by the alchemists were practically on the same model as those in use to-day.

There are no written records of Chaldaean alchemy extant. Hermes Trismegistus, an Egyptian who lived about the time of Moses, is the earliest alchemist of whom we have any knowledge. When we refer to a hermetically closed vessel, we unconsciously recall the directions which Hermes gave for tightly closing the philosopher's "egg," in which transmutations took place. He held the

Egypt in 640, seem to have absorbed the philosophy of the Greeks through the Syrians of Mesopotamia and to have combined with it the practical knowledge of the temple laboratories of Egypt. To Geber, one of the chief Arabian students of alchemy, is attributed the doctrine that all metals are composed of mercury and sulphur. He appears to have been acquainted with saltpetre, sal ammoniac, green vitriol, and aqua fortis, and with processes of sublimation, distillation, filtration, and crystallisation. He devised the



Alchemy. Sketch from a painting by Pieter Brueghel (1564-1637). At foot of the original is a Dutch rhyming inscription to the effect that the alchemist wastes time and treasure, and in the end starves in a workhouse

view that "as all things were produced by the one Being, so all things were produced from this one thing by adaptation," and, apparently, that nothing in the world dies, only changes, an anticipation of what is known as the conservation of energy. Other Egyptian writings dealing with alchemy are the Ebers papyrus, the Chrysopoeia of Cleopatra, which gives methods of distillation, and that of Mary the Jewess.

The Greek philosophers and physicians who flourished between 400 B.C. and A.D. 100 include Aristotle, who added to the four elements of Empedocles—earth, water, air, and fire—a fifth, which he termed ether or quintessence; and Pliny the Elder (d. A.D. 79) devoted five volumes of his *Historia Naturalis* to chemical knowledge. Zosimus of Panopolis (probably 3rd century) is said to have originated the maxim: like begets like. Africanus the Syrian, Synesius of Cyrene, Olympiodorus of Thebes (5th century), and Galen may also be referred to.

The Arabians, who conquered

method of making milk of sulphur. Avicenna (Ibn Sena), known for his controversy with Rhases as to the truth of alchemy, is credited with the observation: he who knows no chemistry does not deserve the name of a philosopher. The Arabs or Moors, passing through Northern Africa, crossed to Spain, and thus the knowledge of alchemy spread over Western Europe.

The best known Western alchemists of the 13th and 14th centuries are Albertus Magnus, Vincent of Beauvais, Roger Bacon, Thomas Aquinas, Raymond Lully, and Arnold de Villanova. Roger Bacon discovered the telescope, and the gunpowder recipe given in his *De Secretis* was first used in warfare by the English in 1327. Thomas Aquinas first used the term amalgam to designate an alloy with mercury. Raymond Lully is said to have been employed by Edward I at Westminster to multiply gold for minting. Nicolas Flamellus (d. 1418), the French alchemist, is alleged to have discovered how to transmute base metals into gold

from a book by Abraham Eleazar, who professed to have obtained his knowledge from copper tablets engraved by Tubal Cain.

The chief alchemists of the 15th century were Isaac of Holland, the first of the Dutch alchemists, Basil Valentine, Bernard Trevisan, Philip Ulstadt of Nuremberg, Sir George Ripley, and Thomas Norton. Basil Valentine introduced the use of antimony into medicine and insisted that if an alchemist would transmute metals he must be a pure instrument. Bernard Trevisan squandered enormous sums in search of the philosopher's stone. Philip Ulstadt is known chiefly for his researches on alcohol. Sir George Ripley published *The Compound of Al-chemie* in 1471 and the *Medulla Alchimiae* in 1476. He describes the twelve chemical processes needed by the alchemist. Thomas Norton, a pupil of Ripley, held that alchemical knowledge could only be obtained by word of mouth from an adept. His *Ordinal of Alchemy* is in verse. One curious idea of his was that metals "grow" in the earth, and he recommended that exhausted mines be closed up to allow the metal to grow again.

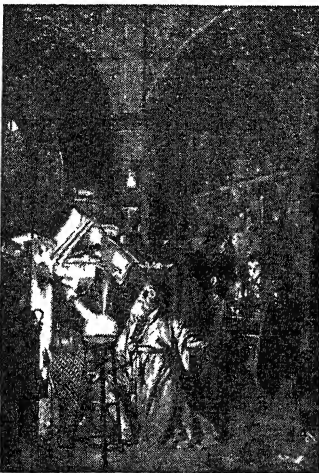
The 16th century produced many alchemists. Among them was the famous Paracelsus, who is known as the first iatrochemist, because he taught that the object of chemistry is not to make gold but to heal disease. He invented laudanum and opodeldoc, and in his medical practice administered heroic doses of mineral drugs, such as corrosive sublimate, turpith mineral, alembroth salt, red precipitate, and antimony. Paracelsus announced that he had found the elixir of life, but died aged 48.

First Use of the Term Gas

Edward Kelley (1555-95) professed to have discovered at Glastonbury Abbey *The Book of S. Dunstan* and two caskets containing red and white philosopher's stone. He and his master (or dupe), Dr. Dee, wandered over Europe, Kelley pretending to exhibit the process of transmutation. Andreas Libavius (d. 1616) discovered tin tetrachloride, or *spiritus fumans Libavii*. He prepared sulphuric acid from alum and green vitriol and made artificial rubies. John Baptist van Helmont (1577-1644) spent most of his time trying to discover the alcahest, and was the first to use the term gas. Gas pingue was the name applied to impure ammonia and gas silvestre to carbonic acid gas. Oswald Croll was the discoverer of succinic acid and silver

chloride. The Rosicrucian Society, which flourished during the 16th and 17th centuries and was defended in sixteen books by Robert Fludd (1574-1637), was a secret confraternity devoted to the practices of alchemy and astrology.

The first of the 17th century alchemists, Christopher Baldwin, contrived to hit upon the method of making phosphorescent calcium nitrate, which became known as Baldwin's phosphorus. He also prepared a *spiritus mundi*, which he sold as a universal medicine. Phosphorus itself was first made in 1674 by Brand of Hamburg, who



Alchemist. Eighteenth century impression of laboratory with an alchemist watching an experiment
After Joseph Wright of Derby

sold the secret to one Krafft, who exhibited the chemical as a curiosity at the courts of Europe. Johann Kunkel, an apothecary who practised alchemy, obtained hints on the manufacture of phosphorus from either Brand or Krafft, and succeeded in making it in 1678. Great hopes were entertained that phosphorus would help to solve the problem of making the philosopher's stone.

Sir Kenelm Digby (1603-65), author of a work on *Chemical Secrets*, prepared a powder of sympathy, one for curing a wound by sprinkling it on the instrument which caused it. The powder, according to his laboratory assistant Hartman, was dried sulphate of iron. Sir Kenelm also devised a tincture of gold as a universal remedy for diseases. Adrian Mynsicht was the inventor of tartar emetic and of an elixir which, as elixir of vitriol, is still in use. Its inventor thought it would prolong life.

John Rudolph Glauber (1603-68) prepared a panacea or uni-

versal medicine from antimony. He is best known for his sal mirabile or sodium sulphate, which he lauded as of the nature of the alcahest. A useful aperient, it is still sold as Glauber's salts. Working on the same lines, Christopher Glaser succeeded in producing a salt which he named sal polychrestum Glaseri. It was potassium sulphate and its inventor deemed it useful in promoting long life. Thomas Vaughan (1622-66), who wrote under the name of Eugenius Philalethes a book describing the preparation of philosophical mercury, is sometimes confused with the writer who employed the pseudonym Eirenaeus Philoponus Philalethes, and whose real name is supposed to have been Childe. He wrote *The Marrow of Alchemy* and *The Secret of the Immortal Liquor Alcahest* or *Ignis-Aqua*, and claimed to have discovered the philosopher's stone in 1645. A pupil of his, George Starkey (d. 1665), practised medicine in the English colonies of America. He published pamphlets dealing with the efficacy of an oil made of sulphur vive and a pill of his own invention. His best known alchemical work is entitled *Liquor Alcahest*: a discourse of that immortal dissolvent of Paracelsus and Helmont.

Robert Boyle's Epoch-making Work

Nicolas Le Fevre (d. 1609), chemist and apothecary to Charles II, published in Paris, 1660, his *Traité de la Chymie*. This was translated into English by "P. D. C. Esq^{re}" in 1664, under the title *A Compendious Body of Chymistry*, rev. ed. 1670. Therein was expressed the view that the mercury of the philosophers might be discovered by systematic search. Nicholas Lemery (d. 1715) still believed in the old conception of the five elements, but his *Cours de Chymie* shows a distinct advance towards rational views in regard to chemistry. It was Robert Boyle, however, to whom modern chemistry looks as its founder. In his *Sceptical Chymist*, published in 1661, he finally overthrew the Aristotelian view of the elements and the Paracelsian theory of three principles. He first laid down the axiom that the highest aim of chemical research is the advancement of natural knowledge.

James Price (1752-83), a chemist who is sometimes known as the last of the alchemists, professed in 1782 to have discovered the philosopher's stone, and in the presence of several peers used his white and red powders to prepare

silver and gold from mercury. Some doubt being cast on the genuineness of these experiments, he was required by the Royal Society to repeat them. On the appointed day, however, he was found to have committed suicide by drinking cherry laurel water.

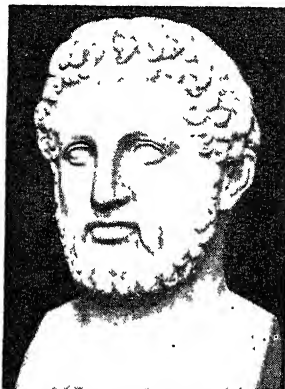
Bibliography. *Les Origines de l'Alchimie*, M. P. E. Berthelot, 1885; *Hermetic and Alchemical Writings of Paracelsus*, ed. A. E. Waite, 2 vols., 1894; *Alchemy, Ancient and Modern*, H. S. Redgrove, 1922; *Alchemy, child of Greek Philosophy*, A. J. Hopkins, 1935; *Modern Alchemy*, W. A. Noyes, 1933. Alchemical charlatanry is satirised in Ben Jonson's comedy *The Alchemist* and incidentally in Sir Walter Scott's novel *The Antiquary*.

Alcibiades (c. 450-404 B.C.). Athenian statesman and general. The son of Cleinias, he was born at Athens during the ascendancy of his kinsman Pericles. Endowed with rank, wealth, and personal beauty, he remains a most striking example of brilliancy ruined by recklessness and lack of principle. He was among the companions, though not the imitators, of Socrates, who saved his life at the battle of Potidaea (432 B.C.), and whose life he saved in return at the battle of Delium (424).

Shortly afterwards Alcibiades plunged into politics, his brilliant qualities and lavish expenditure connected with the state services securing him a dangerous and unstable popularity. He stirred up the Athenians to organize the expedition against Syracuse in 415, when the war between Athens and Sparta was suspended. Alcibiades procured his own appointment to the command with two other generals, but on the eve of the expedition Athens was horrified by the midnight mutilation of the sacred images called *Hermæ*. Alcibiades was charged with this and other sacrilegious offences. But his enemies waited until he had sailed in the expedition to Sicily before openly impeaching him. He was summoned from Sicily to meet the accusation. Perhaps conscious of guilt, certainly in a spirit of revenge, he betook himself to Sparta instead of returning home, and there set about intriguing for a renewal of the war against his native city.

Having succeeded, Alcibiades crossed over to Ionia, to carry out further treasonable projects against Athens. But when he discovered that some of the jealous Spartan magnates were endeavouring to bring about his own downfall, his anger turned against them. Going in 412 to

the court of the Persian satrap Tissaphernes, who was in alliance with the Spartans, he acquired great influence, which he now employed in favour of the Athenians. As a result Tissaphernes changed sides and Alcibiades was reinstated in the favour of his countrymen (411). Elected to the command of their armies without returning to Athens, he achieved a series of military and naval successes during



Alcibiades, Athenian statesman and general
Bust in the Villa Albani, Rome

the next four years, at the end of which he was received by the Athenians with enthusiasm. Two defeats, however, again deprived him of popular favour, and he retired to his estate in the Thracian Chersonese, whence, after the fall of Athens in 404, he returned to Asia Minor, probably intending to seek the favour of the Persian king Artaxerxes. But before he could carry out this plan he was assassinated. *See Greece: History.*

Alciiformes. Order of birds. More familiarly known as the auk family, it includes the puffin, razorbill, and guillemot. *See Auk.*

Alcinous. Legendary hero of Greece. In Homer's *Odyssey* he is represented as king of the Phaeacians and dwelling on the island of Scheria, identified by some with Corfu. During his wanderings Odysseus and some companions were shipwrecked on the island, where they were hospitably received before being sent on their homeward way. The halls and gardens of Alcinous were regarded as exceptionally splendid, and his subjects had a great reputation as skilled seamen.

Alciphron. Greek writer of the 2nd century A.D. He was the author of a collection of letters valuable for the light they throw on the manners and customs of the fishermen, peasants, parasites,

and courtesans of the Athens of the 4th century B.C.

Alcira. Town of Spain, in Valencia province. On the Júcar, 23 m. S. of Valencia by the rly. to Alicante, it trades in silk, rice, and oranges, and exports timber. Pop. 22,057.

Alcmaeon. In Greek legend, son of Amphiaraus and Eriphyle. Charged by his father with the duty of taking vengeance upon Eriphyle, who, bribed by the necklace of Harmonia, had persuaded her husband to join the fatal expedition against Thebes, Alcmaeon killed his mother. For this he was pursued by the Furies and, after many wanderings, reached Psophis in Arcadia, where he was purified of his crime by King Phegeus. He married first Arsinoë, daughter of Phegeus, to whom he gave the necklace of Harmonia, and, after divorcing her, Callirrhoe, daughter of a river god. Callirrhoe desiring to possess the necklace, Alcmaeon obtained it by a trick, but was slain by the brothers of Arsinoë.

Alcmaeon of Crotona. Greek physician and philosopher. A younger contemporary of Pythagoras, he lived about 500 B.C. and taught the doctrine of opposites (right and left, light and darkness). The soul was situated in the brain and, like the stars, was eternally in motion. Sensations were conveyed through pores or passages to the mind.

Alcmaeonidae. Noble family of ancient Athens, descendants of Alcmaeon, a Dorian immigrant from Pylos. A member of this family, Megacles, killed the insurgent Cylon and his supporters, after they had left the sanctuary of the altars of the gods on the Acropolis under a promise that their lives should be spared (c. 630 B.C.). Megacles was declared to have committed an abominable sacrilege, and the whole family was banished from the city. They did not return permanently to Athens until 509. They joined the popular party, and the head of the family, Cleisthenes, was responsible for the new and more democratic constitution at Athens. *See Cleisthenes.*

Alcman (c. 620 B.C.). Greek lyric poet. Born at Sardes in Lydia, he was the author of hymns, *epinikia* (songs of victory) and *parthenia* (songs intended to be sung by choruses of maidens). He wrote in the Doric dialect, with an admixture of Aeolic elements.

Alcobaça. City of Portugal, in Leiria district. Picturesquely situated between the Alcoa and Baça rivers, it is 60 m. N. of

Lisbon. Its Cistercian abbey, built 1148-1222, and one of the largest in the world, was sacked by the French in 1810, secularised in 1834, and later restored. In the early Gothic church are the tombs of Pedro I and his consort, Inez de Castro.

Alcock, Sir John (1892-1919). British airman, the first to pilot an aeroplane non-stop across the



Sir John Alcock,
British airman

Atlantic. Born in Manchester, he was trained as an engineer, being for some time at the Empress Motor Works there. He soon, however, turned his attention to aviation, and in 1912 gained the flying certificate of the Royal Aero Club. He then took part in various races, winning second place in 1913 in the race from London to Manchester and back again. In the First Great War, as a member of the R.N.A.S., he won the D.S.O., held the record for a long-distance bombing raid, and was captured by the Turks. On his return in 1919 he entered, with Lieutenant A. W. Brown, of the R.A.F., for the £10,000 prize offered by The Daily Mail for a flight across the Atlantic. On June 14, 1919, they left Newfoundland and on the next morning arrived at Clifden, Ireland. A few days later both were knighted. Alcock was killed when his aeroplane crashed at Côte d'Erard, N. of Rouen, Dec. 18, 1919, during a flight from London to Paris. See *Atlantic Flights*, and illus. p. 137.

Alcock, Sir Rutherford (1809-97). British diplomatist. Born in London, and a medical student at King's College, he saw medical service in Spain during the Carlist war, 1833-36. In 1844 he went to China as British consul, serving at Amoy and Shanghai. He was the pioneer of the model settlement of Shanghai. In 1859 he became minister plenipotentiary in Japan and from 1865 until 1871, when he retired, he was minister plenipotentiary at Peking. In 1862 he was made a K.C.B. He died in London, Nov. 2, 1897. His writings include *The Capital*



Sir R. Alcock,
British diplomatist

of the Tycoon, 1863, and *Art and Art Industries in Japan*, 1878.

Alcoforado, Marianna (1640-1723). Portuguese nun and letter-writer. Born at Beja, she was placed in a convent of that town at the age of twelve, and four years later was professed as a nun. In 1665 a young French officer, Noel Bouton, afterwards marquis de Chamilly and marshal of France, visited the convent, and remained on visiting terms for two years. Marianna's five letters describe how Noel came, saw, conquered, and rode away, and reveal her agony of grief, her pride in her passion, and finally her contempt for it. They were written between Dec., 1667, and June, 1668, and were first published anonymously in Paris in a French translation in Jan., 1669. Not until 1810 was the name of the writer discovered. The first English translation, *Five Love Letters from a Nun to a Cavalier*, was made by Sir Roger L'Estrange, 1678.

Alcohol. Used without qualification, the word means ethyl alcohol, a compound of carbon, hydrogen, and oxygen with the chemical formula C_2H_5OH . The origin of the word is obscure: it comes from the Arabic *al-koh'l*, denoting native antimony sulphide, a substance that has long been used in the East, in the form of an impalpable powder, to darken the eyelids. In the course of time the word was applied to fine powders generally; and later, probably because of the similarity of the process of sublimation, by which the finest powders were obtained, to that of distillation, it was used to describe the spirit obtained from wine. Early references to alcohol are hence somewhat indefinite, but Andreas Libavius, in his *Alchymia* (1597), makes a distinct reference to it in its present sense. Spirituous beverages have been known from time immemorial, and alcoholic fermentation, the mysterious and apparently spontaneous change which converted the insipid juice of the grape into stimulating wine, fascinated the natural philosophers from the earliest times. The Chinese seem to have been familiar with the process of distillation in the remote past, but it is usually claimed that Arabian chemists were the discoverers of alcohol from wine. In all probability, however, the credit must be given to Italian chemists of the 9th and 10th centuries. Although the words "alcohol"

and "spirits" are synonymous, it is customary in modern usage to refer to alcohol when industrial use is intended, and to spirits in connexion with potable use.

Ethyl alcohol, the ingredient of the various "alcoholic drinks" (to which their inebriating properties are mainly due), is itself a transparent colourless liquid, lighter than water, with a somewhat ethereal smell and burning taste. It is easily inflammable, burning with a blue, non-luminous flame. When the vapour is mixed with air an explosive compound is formed, and on this account it is used as a source of power in internal combustion engines. When alcohol is mixed with water a rise of temperature takes place with a diminution of volume.

MANUFACTURE. Alcohol can be made from its elements, but the usual practice is to obtain it by dehydrating the products of the distillation of fermented liquids. The fermentation of sugars and starches for the production of alcohol is carried on to an enormous extent, the principal raw materials currently used being sugar-containing substances such as molasses, and starch-containing substances such as cereals and potatoes. Generally, molasses is used for the production of alcohol for non-potable, i.e. industrial purposes, and malted or unmalted grain for whisky and other potable spirits. It can also be derived from alcohol-containing liquids such as wines. In both Great Britain and the United States large quantities of alcohol are made from molasses, which is a by-product in the manufacture of raw sugar, representing mother liquors from which sugar is no longer obtainable by crystallisation. The molasses is diluted and fermented in tanks by yeast, which converts the sugars into alcohol and carbon dioxide, the latter being sometimes collected as a valuable by-product. The fermented mash is then distilled. A continuous process for the alcoholic fermentation of molasses has been devised. In France sugar-beets are used as a source of alcohol.

The production of alcohol from grain dates back to very ancient times. The starch of grain is not directly fermentable by yeast and must, therefore, first be converted to sugar. This is done by employing either malt or certain moulds, the use of the former in the production of industrial alcohol being identical

with the methods employed in beer-making. The grain is first ground and cooked with steam under pressure; after cooling, malt is added, the diastatic enzymes of which convert practically all the starch to sugar; yeast is then added to convert the sugar to alcohol and the fermented liquid is finally distilled. In the "amyl" process of fermentation largely used on the Continent, the starches are saccharified by means of moulds, the process taking its name from *Amylomyces Rouxii*, the mould originally employed. It has recently been shown that the use of moulds in the saccharification of starchy grain mashes for the manufacture of industrial alcohol is of economic interest, the mould *Aspergillus oryzae* yielding the most satisfactory results.

Alcohol may also be made from wood by resolving the cellulose of that material into dextrose and other sugars by treatment with acids under pressure. After neutralisation of the acids, yeast is added and the resultant alcohol separated by distillation. For many years the European chemical industry, particularly the German chemical industry, has produced part of its alcohol requirements by hydrolysing wood waste to sugar, and subsequent fermentation to alcohol, and it has been estimated that 500 million gallons could be obtained in the United States from sulphite mills and sawmills. In 1945 a large commercial plant was built in the United States to produce ethyl alcohol from sawdust and waste wood. The new plant has an estimated annual production of 4,100,000 gallons of alcohol at a low cost per gallon. Other materials suitable for the production of alcohol include the Jerusalem artichoke (*Helianthus tuberosus*) and whey, as well as a wide variety of plants. Ethyl alcohol may be prepared synthetically by a number of methods, e.g., from acetylene by hydration in the presence of a mercury salt and reduction of the resultant aldehyde, or from ethylene passed into sulphuric acid and hydrolysis of the ethyl acid sulphate.

DISTILLATION. This is the process by which the alcohol is separated from water and other matters. The apparatus used, called a still, consists of two parts, the analyser and the rectifier. The action of the first depends upon the fact that the mixed vapours of alcohol and water, cooled in a suitable manner, can be separated

into two parts, one containing a large proportion of alcohol and the other being mostly water. The rectifier in successive stages renders the liquid stronger in alcohol.

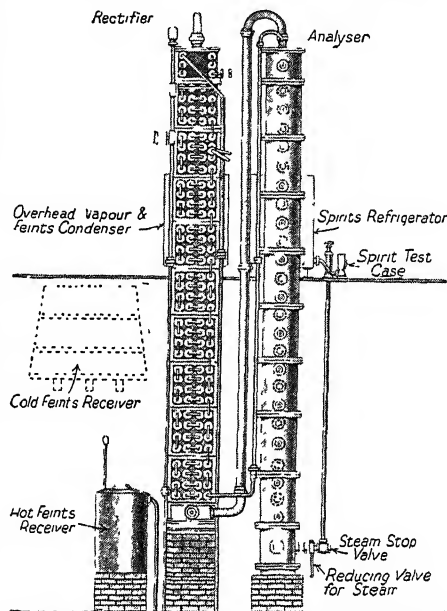
Along with the alcohol are small quantities of other volatile products, of which fusel oil or amylic alcohol is the most objectionable. This can be got rid of by con-

spirit produced is of the strength of 91 p.c. and after redistillation is known as rectified spirit. Continuous still spirit has very little flavour, but by blending and distilling with various flavouring agents, potable spirits, e.g. whisky, gin, and British brandy are obtained.

As fractional distillation will produce alcohol of a maximum concentration of 95 p.c., it is important to find a commercial method whereby absolute alcohol can be obtained directly, involving but one distillation. This is carried out by adding benzene and distilling, a ternary benzene-alcohol-water compound being separated in the distillation, leaving the absolute alcohol to come over last. The operation may be continuous. Two other dehydrating agents used in industry are calcium sulphate, and potassium and sodium acetates in aqueous solution. Absolute alcohol can also be obtained by adding quicklime to the alcohol as it leaves the still, the quicklime combining with the water to form calcium hydrate.

ALCOHOL IN BEVERAGES. The amount of alcohol contained in alcoholic beverages is approximately as follows: brandy, 50 p.c. to 70 p.c.; gin, 25 p.c. to 50 p.c.; whisky and rum, 51 p.c. to 54 p.c.; beer, 2 p.c. to 6 p.c.; claret and hock, 8 p.c. to 10 p.c.; Chablis and Chianti, 9 p.c. to 12 p.c.; sherry and port, 15 p.c. to 20 p.c. Consumption of alcoholic beverages per head p.a. in the United Kingdom is approximately as follows: beer, 33.1 gallons; spirits, 0.2 gallons; wines, 0.3 gallons.

ALCOHOL IN THE SECOND GREAT WAR. The use of alcohol in the production of military weapons reached enormous proportions during the Second Great War. It was a necessary material in the production of smokeless powder, an antifreeze for tanks and aircraft, an ingredient in medical supplies, and a basic substance in the manufacture of numerous essential chemicals. The principal reason, however, for the vast



Alcohol. Section of a continuous steam still on the Coffey principle mentioned in the text

concentrating the alcohol, when the difference in the boiling points of the liquids allows of separation in the still.

The chief kinds of still employed in making alcohol are the pot still and the continuous still. The first form is the more primitive and is employed in preparing some kinds of whisky. The direct heat used in this still brings about certain alterations in the character of the wash which communicates distinctive flavours. The pot still is not adapted to the economical production of pure spirit. The continuous still is less expensive to use and involves much saving in time and labour. The fermented liquor is entirely deprived of alcohol in a continuous process, the spent wash and concentrated spirit leaving the still by the two separate exits.

One of the earliest continuous stills was that invented by Coffey in 1832. It consists of two tall columns, the one being the analyser and the other the rectifier. The

expansion in the manufacture of alcohol was its use as a basic material in the production of synthetic rubber (*q.v.*), necessitated by the loss of the Far Eastern natural rubber plantations. Approximately 127 million gallons of alcohol were used in the United States for this purpose in 1943. Buna-S, the principal synthetic rubber, was made from butadiene, a large proportion of which was prepared from alcohol.

INDUSTRIAL USES. In addition to its use in the form of beverages, alcohol finds application in industry in two main directions: (1) as a solvent and (2) as a raw material for chemical manufacture. By reason of its exceptional solvent powers, it is invaluable in making varnishes, lacquers, artificial silk, and celluloid. It is used in making fireworks, matches, dyes, perfumery, medicines, ether, chloroform, ethyl chloride and bromide, alkaloids, surgical dressings, disinfectants, photographic plates, insulin, liver extract, ethyl esters, acetone and acetic acid. It is a useful material in laundries and dyeworks, hospitals, laboratories and museums for the preservation of specimens.

ALCOHOLS IN CHEMISTRY. As already stated there are several classes of alcohols in chemistry, all being characterised by containing one or more hydroxyl (OH) groups. These are described as monohydric, dihydric, trihydric, and polyhydric, according to the number of hydroxyl groups present in them. A further distinction into primary, secondary, and tertiary alcohols is based upon differences in structure. The alcohol group of chemical compounds contains many substances quite dissimilar in appearance, *e.g.* mobile wood spirit; viscid, heavy glycerol; and solid, wax-like cerotin.

DUTY. The manufacture, sale, and distribution of alcoholic liquors has for long been subject to legal control in Great Britain and a large revenue is raised by duties on spirits. The Finance Act of 1940 provided for a duty on spirits of £4 17s. 6d. per proof gallon, to which, in the case of spirits warehoused for less than two years (immature spirits) was added 1s. 6d. per gallon under the provisions of the Finance Act, 1915. This surtax, however, was not charged on immature spirits used in making articles recognized as medicinal or for scientific purposes, and the concession was extended to the additional duties

imposed on spirits by the Finance Act, 1918, and the Finance Act 1920. This rebate was made by way of repayment of the additional duty which had to be paid in the first instance. Thus plain British spirits less than two years old would be charged the regular duty of £4 17s. 6d. plus 1s. 6d. immature spirits duty, and if used for a recognized medical or scientific purpose, repayment could be obtained of the duty in excess of 14s. 9d. per proof gallon. The Finance Act of 1943 increased the duty on spirits to £7 17s. 6d.

As the tax on spirits was many times the value of the spirits, it was impossible, owing to the cost, to use spirits industrially, and a demand arose in 1853 for duty-free alcohol for such use. In consequence an Act of 1855 was passed, allowing the use free of duty of methylated spirits, *i.e.* pure spirits denaturised with wood naphtha so as to be unfit for use as a beverage. In 1906 an allowance of 3d. per proof gallon was granted in respect of all alcohol deliveries for industrial purposes and that rate remained unchanged until 1921, when the allowance was increased to 5d.

During the Second Great War, in order that output for war purposes might not be impeded, certain restrictions on distillers were suspended by the Defence (General) Regulations, and in 1945 the restrictions on concurrent brewing and distilling contained in the Spirits Act of 1880 were permanently relaxed. At the same time power was given to the commissioners of customs and excise to replace such parts of the Spirits Act as had become out of date, thus providing for a more modern system of control. The allowances mentioned above were simultaneously withdrawn. The methylated spirits referred to above are now available for industrial and power uses in five varieties. See Distilling; Methylated Spirits; Rubber; Spirits, etc.

A. Shepherd, M.P.S.

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Alcoholism. Habit of taking alcoholic liquor to excess. It differs widely among different

racés, and it has been shown that the vice is least prevalent among nations which have known longest how to prepare drinks containing alcohol, and worst among those to whom it has been introduced recently.

While there is a racial factor in inebriety, much can be done to reduce the evil by control of the drink traffic, by education, and by encouraging a higher moral standard. The effects on the body of excessive indulgence in alcohol are serious, there being scarcely an organ or tissue which does not suffer directly or indirectly as a result of long-continued drinking. Delirium tremens is a form of acute alcoholic insanity, and complete mental breakdown may follow chronic alcoholism. Neuritis or inflammation of the nerves is another common effect. Alcoholism may produce "gin-drinker's" or "hobnail" liver, disorders of digestion, disease of the kidneys, and degeneration of the heart and arteries.

Treatment of alcoholism requires much patience and perseverance. Persons of strong will can sometimes break themselves of the habit, but most alcoholics require assistance by having alcohol placed for a time beyond their reach, or by living in a home for inebriates or with friends who can control them.

Alcoholometry. The measurement of the amount of ethyl alcohol in a liquid. In mixtures of alcohol and water alone this is done by finding the specific gravity by a Sikes's hydrometer and referring to standard tables giving the percentage of alcohol corresponding to the specific gravity. If the liquid consists of three or more different substances, it is sometimes possible to distil off the alcohol and measure this separately. In other cases volatile substances can be extracted by chemical means and the alcohol is then separated by distillation.

In Great Britain the strength of alcoholic liquors for excise purposes is stated by reference to proof spirit, a mixture of alcohol and water with a specific gravity of 0.91976 at 15.6° C., containing 57.1 per cent of alcohol by volume. Other strengths of spirit are described as being so many degrees overproof or underproof: thus a spirit of 20° overproof is such that 100 volumes of it must be diluted with 20 volumes of water to make it of proof strength.

Alcornoco Bark. Reddish-brown bark of a Brazilian tree of the pea family, *Bowdichia virgilioides*. This tree is abundant in the campos, and is of handsome appearance, the upper branches being clad with bright blue flowers. The bark is bitter and astringent, and colours the saliva yellow. It is used as a tonic, and was formerly prescribed in consumption.

Alcott, AMOS BRONSON (1799-1888). American educationist and philosopher. Born at Wolcott, Connecticut, Nov. 29, 1799, he turned from peddling books to school keeping in 1823. At his school at Cheshire, Connecticut, and at the Temple School, Boston, 1834-9, he introduced a number of reforms in the physical and mental training of the pupils on Pestalozzian lines, which aroused the hostile criticism of the press and of other schoolmasters. Alcott devoted the last fifty years of his life to philosophy, and was leader of the American Transcendentalists, a contributor to *The Dial*, and a friend of Emerson. He died at Boston, March 4, 1888. *See* Life, F. B. Sanborn and W. T. Harris, 1893.

Alcott, LOUISA MAY (1832-88). American authoress. She was born at Germantown, Pennsylvania, U.S.A., Nov. 29, 1832, the daughter of Amos Bronson Alcott, and was engaged for several years in teaching. Her first book, *Flower*



Fables, was published in 1855, but she first attracted attention by *Hospital Sketches* (1863), the record of her experience as an army nurse in the Civil War. Her *Little Women* (1868, second series 1869; dramatised version produced in London, 1919) made her famous. Her other works include *An Old-Fashioned Girl*, 1869; *Little Men*, 1871; *Good Wives*, 1871, and *Jo's Boys*, 1886. She died at Boston, March 6, 1888. *See* Life, Letters and Journals, ed. E. D. Cheney, 1889; Life, B. Moses, 1909.

Alcoy. Town of Spain, in Alicante province. The terminus of two small rlys., it is 24 m. N. of Alicante, and is built in a mt. gorge. It is hemmed in by streams which supply power for cloth, match, and cigarette factories. Pop. 45,857.

Alcuin or ALBERNUS (735-804). English scholar and theologian. He was born at York, and was educated at the cloister school



Alcuin. Frontispiece to the Alcuin Bible, a Latin version produced at Tours c. 840. It shows the evangelists and their emblems with Alcuin (centre)

British Museum

under Egbert and Ethelbert, in 778 succeeding Ethelbert as master. In 781, at the invitation of Charlemagne, he established a school in the imperial palace at Aix-la-Chapelle, which under his care became a famous seat of learning. For his services Charlemagne bestowed on him the abbey of Ferriers in Gatinais, S. Loup at Troyes, and S. Martin at Tours. In 790 he was in England on a political mission. Returning in 792 to his scholastic work on the continent, he defended the faith against the Adoptionist heresy of Felix and Elipand. He retired in 796 to Tours, where he founded a school. From Tours he corresponded with Charlemagne, and he died there May 19, 804.

Theologian, philosopher, orator, historian, and poet, Alcuin was the foremost scholar of his time. His works, which include a life of S. Willibrord, were printed in 1777 at Ratisbon. *See* Lives by A. F. West, 1893, and C. J. B.

Gaskoin, 1904; Schools of Charles the Great, J. Bass Mullinger, 1877.

Alcyone. Star η Tauri, one of the Pleiades. It is called after the daughter of Atlas and Pleione, and is of the third magnitude.

Alcyone (Greek, kingfisher). In Greek mythology, daughter of Aeolus, the wind-god, and wife of Ceyx, son of Heosphorus, the Morning Star. In their pride husband and wife called themselves Zeus and Hera and were changed by Zeus into sea-birds. In a variant legend Ceyx was drowned on a voyage, his body was found on the shore by his wife, and the gods, pitying her sorrow, changed both into kingfishers. For seven days during winter she broods over the sea, while her father causes all the winds to cease and calm to reign, this being the origin of the phrase halcyon days.

Aldbrough. Village in the W. Riding of Yorkshire, England. It is 1 m. E. of Boroughbridge railway station and lies 16 m.

N.W. of York. It returned two members to Parliament from Elizabeth's time until 1832, when it was disfranchised. It has many remains of Isurium, the supposed capital of the Brigantes.

Aldebaran. Star α Tauri, the Follower (of the Pleiades). A shade less bright than first magnitude and conspicuous for its ruddy colour, it is the chief object in the group of the Hyades, its intrinsic light being some 95 times that of the sun.

Alde. River of Suffolk, England. Rising at Brundish, it flows S.E. to Rendham and Stratford St. Andrew, almost meeting the sea at Aldeburgh (*v.i.*). A strip of shingle then cuts it off from the coast, and it flows several miles S. to Hollesley Bay below Orford. This last stretch is the subject of a poem by John Freeman.

Aldeburgh OR ALDEBOROUGH. Mun. borough and seaside resort of Suffolk, England. It is on the Alde estuary, 99 m. E.N.E. of London on the railway. A fishing centre, with a half-timbered 16th century moot hall, Aldeburgh was an important town in the 16th century. It was the birthplace of the poet Crabbe, and a favourite resort of Edward Fitzgerald and George Meredith. In 1832 it was disfranchised. In 1908 Mrs. Garrett Anderson was elected mayor of Aldeburgh, being the first woman in England to hold mayoral office. Pop. 2,480.

Aldehydes. Series of organic compounds, mostly liquids, intermediate between the primary alcohols and carboxylic acids, obtained by the oxidation of the primary alcohols. The simplest member is formaldehyde, followed by acetaldehyde. Formaldehyde (formalin, methyl aldehyde, methanal) is an irritating gas, but is usually in solution (40 per cent). It is made by passing methyl alcohol and air over certain metals, or by the dry distillation of calcium formate. Acetaldehyde (aldehyde, ethanal) is a colourless, inflammable liquid with a pungent odour. It can be made by acting on alcohol with potassium dichromate or manganese dioxide and sulphuric acid, but is obtained on a large scale from alcohol and acetylene. It is used as a solvent. See Acetic Acid: Alcohol; Formalin.

Alden, JOHN (c. 1599-1678). One of the Pilgrim Fathers. In 1620 he sailed as a cooper in the Mayflower, and settled at Duxbury, Massachusetts, where for more than forty years he served

as magistrate and sometimes as acting governor. In 1623 he married Priscilla Mullins, whom he had originally courted for his friend Miles Standish—the subject of Longfellow's poem. He died at Duxbury, Sept. 12, 1678. See Pilgrim Fathers.

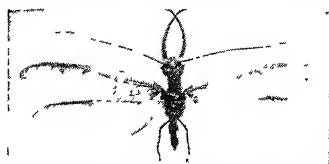
Aldenharn. Village of Hertfordshire, England, 3 m. from Elstree railway station on the main line from St. Pancras, but less than 1 m. to the N. of Watford by-pass. The old church, dating from the 12th cent., was damaged by German bombs in Oct., 1940. Aldenharn school, founded 1597, has a modern chapel, dedicated 1938. Aldenharn House, with famous gardens, originally belonged to Henry Hucks Gibbs (1819-1907), merchant and banker, who was created 1st baron Aldenharn in 1896. During the Second Great War the house was taken over by the B.B.C.

Alder (*Alnus glutinosa*). Small tree that is common in Europe, by riversides and in fens and marshes. It also grows in moist oakwoods away from streams. Its natural range is confined to the northern hemisphere, and it is usually from 20 ft. to 40 ft. in height. The leaves vary from broad oval to round with wavy and toothed margins, and when young are hairy and sticky.

Flowers are produced in catkins. Those containing male flowers being long and pendulous like those of the hazel, while those with female flowers are short and oval. They are formed late in summer, but do not reach maturity until the following March, when they become very conspicuous on the leafless tree. The scales of the female inflorescence become woody, so that the fruit bears a resemblance to a miniature fir-cone. It does not discharge its seeds until the following spring. The roots of the alder bear nodules like those produced on the roots of leguminous plants by nitrate-forming bacteria. Alder wood is light and soft, red when freshly cut, pinkish when dry. If kept constantly moist or submerged it is very durable. Its charcoal is esteemed by gunpowder makers.

Alder-fly (*Sialis*). Name of a family of neuropterous insects related to scorpion flies. The

European alder-fly (*S. lutaria*) passes its larval stage in the water, and is about an inch long. About



Alder-fly. Male specimen of the giant alder-fly (*Corydalus*), Central America

May it leaves the water and buries itself in the ground, where it passes the pupal stage. A few weeks later it emerges as the perfect insect—known to anglers as a good bait for fly-fishing.

Alderman. Word of Anglo-Saxon origin meaning elder man, applied to certain members of town and county councils in England and Wales, and to members of municipal bodies in the U.S.A. and Canada. The Municipal Corporations Act of 1835 established the principle that in England and Wales aldermen should be members of town councils chosen by the councillors. In all English municipalities, except the City of London, the proportion is one alderman to every three councillors, the term of office being six years. For the corporation of the City of London there are 26 aldermen chosen for life.

Alderney (Fr. *Aurigny*, Lat. *Riduna*). The most northerly of the Channel Islands. It is 8 m. W. of Cap de La Hague on the French mainland, from which it is separated by the dangerous Race of Alderney.

Comprising 1,962 acres, it is 4 m. long and $1\frac{1}{2}$ m. wide. Off the W. coast are the perilous Casquet rocks, with three lighthouses. From precipitous cliffs W. and S., of which the highest point is 306 ft., the land slopes down N. and E. to sandy bays. St. Anne, the only town, is situated in the centre. Legislation is in the hands of an elected states, justice in those of a court appointed by the crown. It is a British possession and a dependency of Guernsey. French ceased to be the official language in 1949, being little spoken. The climate is healthy. A blue granite is quarried and exported, but the



Alder. Left, reddish catkins and right, leaves and fruit

chief wealth of Alderney is in its breed of small but excellent cows. Pop. (pre-war) 1,521. The island was occupied by German forces at the beginning of July, 1940. The majority of the inhabitants abandoned their homes and, with refugees from Jersey and Guernsey, made their way to England. The rest, with the exception of one family which refused to move, were deported by the Germans, who turned the whole of Alderney into a strongly fortified garrison and prison camp. The island was liberated by British forces on May 16, 1945, 3,200 Germans being taken prisoner.

Aldersgate. Name of a ward of the City of London and of a street running N. from St. Martin's-le-Grand to Goswell Road. The old gate at the S. end of the street was the N. gate of the city, and is supposed to have been erected by one Aldrich, a Saxon. Rebuilt in 1618 and damaged in the Great Fire, it was finally razed in 1761. John Day, the 16th century publisher, lived over the gate. Notable residents of Aldersgate Street included Mary countess of Pembroke, and Milton. In the grounds of S. Botolph's is Postman's Park, where G. F. Watts inaugurated in 1900 memorial tablets to heroes who gave their lives while performing civilian duties. Wide areas on both sides of Aldersgate Street were devastated as the result of German incendiary and H.E. bombs, 1940-41, particularly on the night of Dec. 29, 1940.

Aldershot. Municipal bor. of Hampshire, England. Situated on the immediate boundaries of Hampshire and Surrey, 34 m. S.W. of London by rly., its charter of incorporation was granted in 1922. The constitution of the borough council is unique in that three of its members are military officers serving in the adjacent camp and nominated to the council by the under-secretary of state for war. That Aldershot has grown from a village with 875 inhabitants in 1851 to a town with a pop. of 34,281 in 1931 is due to the establishment of this large camp.

Just as Shorncliffe camp, near Folkestone, was selected for its strategic position during the Peninsular War, and

Catterick, near Richmond, Yorks, developed from the exigencies of the First Great War, so Aldershot owes its inception to the Crimean War.

As a result of that campaign, it became evident that the regular army would have to establish camps where training facilities existed for the practical training of troops in the field. Lord Hardinge, then C.-in-C., urged for this purpose the purchase of waste land known as Aldershot Heath. In 1854 the War Office was granted £100,000 for the erection of the camp, and in 1855 the provision began of a camp of wooden huts. It was not until some 25-30 years later that more permanent accommodation was provided.

Until 1941 Aldershot was recognized as the chief training command of the British Army. A number of factors, including the possibility of S.E. England being an invasion area, were responsible for the loss of some of Aldershot's military importance. It was reduced in status in 1941 from command to district, becoming the headquarters of Aldershot and Hants district under G.O.C. Southern Command. In the Aldershot area are two sub-districts, North and South Aldershot. South Aldershot, separated from North Aldershot by the Basingstoke Canal, includes Wellington and Stanhope Lines, with barracks at Bordon, Longmoor, and Whitley, and a number of camps erected during the Second Great War. North Aldershot consists of Marlborough Lines, with barracks at Black-

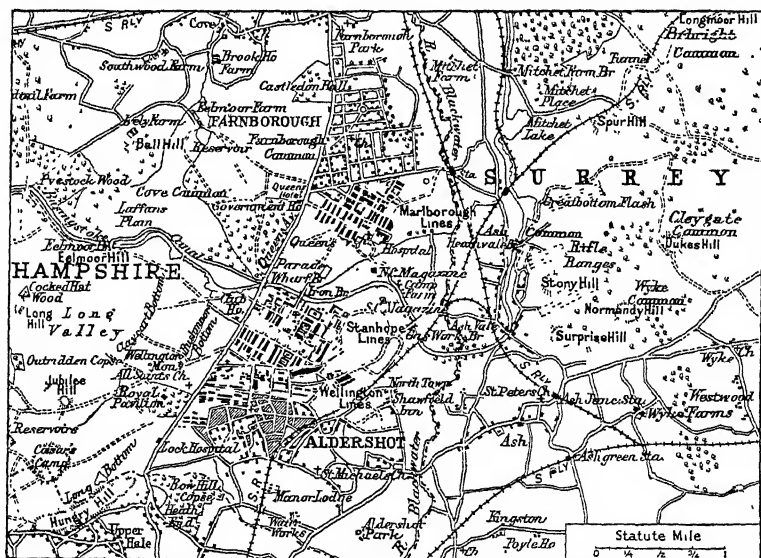
down, Deepcut, Cove, and Crookham, and a few scattered camps.

Accommodation is now provided for some 60,000 troops as compared with 20,000 in 1914. The garrisons are complete with all ancillaries for their maintenance—supply stores, butchery, bakery, electric power and water plants, workshops, offices, churches, and some 1,700 quarters for families of married soldiers. Amenities are also on a generous scale.

It was from Aldershot that the first division of the B.E.F. left for France in 1914; 25 years later the 1st and 2nd divisions of the B.E.F. also left Aldershot for France. During the Second Great War, the average pop. of N. and S. Aldershot sub-districts was 125,000. All Canadian divisions were successively accommodated in Aldershot on arrival in the U.K. From the fall of France to the end of the war, one camp was permanently allotted to the Fighting French. Aldershot also accommodated one of the greatest concentrations of the A.T.S. in the country, an average of some 7,000 women. Other commitments included a New Zealand div. and a Polish armoured div.

Aldershot gives its name to a county division returning one member to Parliament.

The colossal equestrian statue of Wellington, by Matthew Wyatt, on the W. side of Queen's Avenue, originally surmounted an arch opposite Hyde Park Corner, London. It was removed to Aldershot in 1883.



Aldershot : Plan of Britain's premier military camp and army training ground

Alderson, Sir Edward Alfred Hervey (1859–1927). British soldier. Born April 8, 1859, he served with the Mounted Infantry in South Africa in 1881–2, and in the Egyptian campaigns of 1882 and 1884–5. He was in the Mashonaland in 1896, and commanded the Mounted Infantry in S. Africa, 1900–1. After further service in India, he commanded the Canadian division in France during the First Great War, directing it at the second battle of Ypres. When a Canadian Corps was formed he was placed at its head. In 1916 he was made a K.C.B. He died Dec. 14, 1927.

Aldgate. Ward and street of the City of London. The street connects Fenchurch Street with Whitechapel. The old gate was the extreme E. gate of the city; in 1606 it was taken down and rebuilt, being removed finally in 1761. It was at this gate, in 1471, that Faulconbridge was repulsed when attempting to storm London. Chaucer lived in rooms over the gate and John Stow, the antiquary, close by. Aldgate's chief existing relic is the pump, now a drinking-fountain at the W. end of the street. Trolley-bus routes from E. London terminate at Aldgate, and there are two stations, Aldgate and Aldgate East, on the Met. and District rlys. respectively.

Buildings and property in Aldgate suffered considerable damage from German air-raids in both the First and Second Great Wars.

Aldhelm (c. 640–709). English saint, bishop, and scholar. Educated under an Irish monk named Maildulf at Malmesbury and the African scholar Hadrian at Canterbury, he succeeded Maildulf as abbot at Malmesbury about 676, was made bishop of Sherborne in 705, and died May 25, 709. Aldhelm was a skilful architect, and the foundation of the Saxon church of S. Lawrence at Bradford-on-Avon, Wiltshire, has been attributed to him. His writings include the famous riddles in Latin hexameters embodied in a treatise on Latin prosody, Latin verses, and a Latin treatise addressed to the nuns of Barking.

Aldin, Cecil Charles Windsor (1870–1935). British artist. Born at Slough, April 28, 1870, he became well known as a lively delineator of animals, especially dogs and horses. He illustrated Kipling's jungle stories on their first appearance in *The Pall Mall Budget*, 1894–5. His colour-prints of hunting scenes achieved a wide

popularity, as did his illustrations to *A Dog Day*, *The Pickwick Papers*, and *Handley Cross*. He died Jan. 6, 1935.

Aldine Editions. Small octavo or duodecimo editions of the Greek, Latin, and Italian classics printed at Venice, 1494–1597. They were



Aldine. First mark of the Aldine Press

issued from the press in the Campo di S. Agostino founded by the scholar-printer Aldus Manutius, for whom Francesco of Bologna designed the type known as cursive or italic, first used in a Virgil of 1501. Aldus began a revolution in book printing, which combined cheapness, accuracy, and portability with elegance of form, and dominated the 16th century, many counterfeit Aldines being printed at Florence and Lyons. The Aldine mark (see illus.) was adopted in 1830 by William Pickering and adapted later by Bell and Daldy and their successors, George Bell and Sons. See *Manutius, Aldus*.

Aldington, Richard (b. 1892). British writer. He won early reputation as a poet, becoming associated about 1914 with the Imagist group. Later he published critical works, but it was a war novel, *Death of a Hero* (1929), which attracted the most general notice. Later books include *The Colonel's Daughter* (1931), *The Eaten Heart* (lyrics, 1931), *Rejected Guest* (1939), and a biography of Wellington (1946).

Aldis Lamp. A signalling lamp used by the armed forces to transmit messages by Morse code. It is portable and is electrically operated. A handle is provided and to this are fitted two triggers. One of these, when depressed, switches on the 12-volt-36-watt bulb and the other trigger causes a pivoted reflector housed inside the lamp to articulate. In this way the beam moves through an angle of 9 degrees with the result that the receiver of the signal sees the light only when the trigger is pressed down. An aeroscope or telescope is attached to the top of the lamp for the purpose of sighting the lamp when messages are being sent. It can be used in daylight as well as at night at the rate of 30 words a minute.

Aldred (d. 1069). English prelate. A monk of Winchester, he was made abbot of Tavistock

about 1027 and bishop of Worcester in 1044. He went on several diplomatic missions, and visited Jerusalem in 1058. In 1060 he was appointed to the archbishopric of York, which he held jointly with the see of Worcester until compelled to resign the latter by Pope Nicholas II. He crowned William the Conqueror in 1066. The money he acquired was largely devoted to church building and to the endowment of monasteries at York, Beverley, and Southwell.

Aldrich, Henry (1647–1710). English logician and theologian, dean of Christ Church, Oxford. His *Compendium of Logic* long remained the standard text-book. He designed Peckwater Quad and other Oxford buildings, and wrote the well-known Hark, the Bonny Christ Church Bells.

Aldrich, Thomas Bailey (1836–1907). American writer and humorist. He was born at Portsmouth, New Hampshire, Nov. 11, 1836, and

entered business in New York in 1854. Three years later he took to journalism. He was editor of *The Atlantic Monthly*, 1881–90. His light verse is best represented in *The Ballad of*

Babie Bell, 1856, and *Cloth of Gold and Other Poems*, 1874. His stories include *Marjorie Daw and Other People*, 1873, *Prudence Palfrey*, 1874, *The Queen of Sheba*, 1877, and the once very popular *Story of a Bad Boy*, 1870. He died March 19, 1907. See *Life*, F. Greenslet, 1908.

Aldridge, Ira Frederick (c. 1804–67). American actor, called the African Roscius. According to some accounts he was a mulatto born at Baltimore, and was apprenticed to a ship's carpenter. Others state he was a full negro, son of a New York minister, and was born in New York, and trained for the ministry. In 1826 he became valet to Edmund Kean, who was then in America, and accompanied him to England. The association prompted him to go on the stage, and he returned to America in 1830, making his début at Baltimore. His first appearance in London was as Othello at Covent Garden in 1833. Between 1852–9 he toured Germany, Austria, and Russia. He died of typhus fever at Lodz, Poland, Aug. 7, 1867.



Thomas Bailey Aldrich

Aldringer, JOHANN, COUNT VON (1588-1634). German soldier. Born at Thionville, Lorraine, he entered the Spanish army, 1606, and when, in 1618, the Thirty Years' War began, he took service under the emperor Ferdinand II. Aldringer fought against the German Protestants, the Swedes, and the French, his reputation among the Imperialist generals being inferior only to those of Wallenstein and Tilly, under both of whom he served. He was killed at Landshut, Bavaria, July 22, 1634.

Aldwych. London thoroughfare, opened by Edward VII, Oct. 18, 1905. It runs convexly from

and considerable superficial damage to buildings. *See* Kingsway.

Aldwych Club. London club founded in 1911 as a social centre for advertising men. In 1914 it became a general business club. The subscription is 6 gs. a year. The club house is 18, Exeter Street, Aldwych, W.C.

Aldwych Theatre. London playhouse, built by (Sir) Seymour Hicks and opened Dec. 23, 1905, with a revival of his own play for children *Bluebell in Fairyland*. From 1925 to 1933 the theatre was noted for a continuous series of farces, eleven in number, all but two of which were written by Ben Travers. They included *A Cuckoo*

in the Nest, Rookery Nook, Thark, and Turkey Time, and the same principals, Ralph Lynn, Tom Walls, J. Robertson Hare, and Mary Brough were retained for all of them.

Ale. Name given to all malt liquor in England before the introduction of hops in the 16th century. It is now applied

to lighter coloured beer. *See* Beer; Brewing.

Aleander, HIERONYMUS, OR GEROLAMO ALEANDRO (1480-1542). Italian humanist and cardinal. Born at Motta, near Treviso, he was early distinguished for scholarship, and after acting as rector of the university of Paris was

sent by Eberhard, prince-bishop of Liège, to Rome. In 1519 he became librarian of the Vatican. A strong opponent of Luther, against whom he prepared the imperial edict, he endeavoured to check the reform movement in the Netherlands. He was made archbishop of Brindisi in 1524 and a cardinal in 1536.

Aleardi, ALEARDO (1812-78). Italian poet. Born at Verona. Nov. 4, 1812, he became a professor at the Academy of Fine Arts, Florence. His work is notable rather for graceful description than for force of sentiment or emotion. At Verona, where he died, July 17, 1878, a monument has been erected to his memory and a bridge named after him.

Alecto. In Greek mythology, one of the Furies. She is represented with a flaming torch and serpents crawling about her head. *See* Eumenides.

Alekhine, ALEXANDER (1892-1946). World chess champion. A naturalised Frenchman since 1927, he was born in Moscow, Nov. 1, 1892, the son of a noble-

man. He left Russia during the 1917 revolution. His extraordinary mastery of chess was evident in boyhood, and after excelling in several tournaments he defeated J. R. Capablanca (*q.v.*) for the world championship in 1927. He held the title till 1935, lost it then to the Dutchman Max Euwe, and regained it in 1937. At the San Remo tournament in 1930 he set up a world scoring record. He was found dead in Lisbon, Mar. 24, 1946.

Alemán, MATEO (1547-c. 1609). Spanish novelist. Born and educated at Seville, he entered the public service in 1571, and after a somewhat troubled life migrated in 1608 to America, probably to Mexico. His fame rests on his long and popular novel *Guzman de Alfarache*, 1599-1604, which, although impeded by a tendency to moralise, gives a wonderful picture of contemporary Spain.

Alemán, MIGUEL (b. 1902). Mexican president. *See* N.V.

Aleman. Alternative form of Alamanni, a confederation of German Danubian tribes in continuous conflict with the Roman empire during the 3rd and 4th centuries A.D. *See* Alamanni.

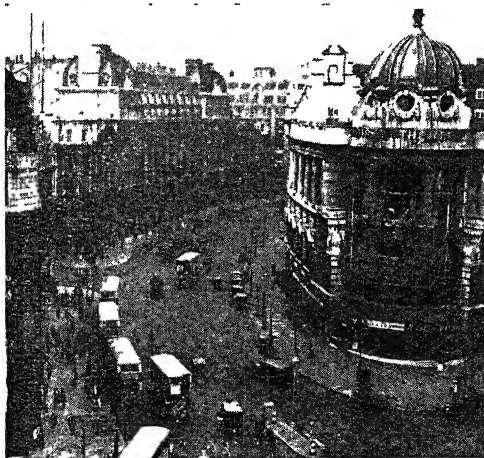


Aldwych Plan or the London thoroughfare superimposed on a map showing the old landmarks which it displaced

the Strand, diverging N.E. at the intersection of Wellington Street and returning near S. Clement Danes. Among the buildings of the island block thus formed are Australia House (1918), India House (1930), and Bush House (1923-34). Aldwych is now a one-way street, for eastbound traffic only. The name is derived from the Danish settlement that once occupied the site. It had already been perpetuated in Wych Street, but this, with the parallel Holywell Street (or Booksellers' Row), was demolished in the improvements. On June 30, 1944, a German flying bomb fell at the junction of Aldwych and Kingsway in the early afternoon, causing many casualties

to lighter coloured beer. *See* Beer; Brewing.

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Aldwych. Western end, with former Gaiety Theatre on right and Waldorf Hotel farther along on left



Alex Alekhine, chess champion

Alembert, JEAN LE ROND D' (1717-83). French mathematician and philosopher. He was founder and joint



Jean d'Alembert, French philosopher
After de la Tour

editor, with Diderot, of the great French encyclopedia. D'Alembert contributed the introduction, in which are discussed, in the manner of Francis Bacon and Locke, the origin and classification of the sciences. His treatise on dynamics enunciated an important principle still known by his name. D'Alembert was a sceptic and relativist, who held that we can only know the relations of phenomena as they appear to us, not their causes. The nature of matter and mind is unknown; all knowledge is derived from sensation. His ethical principles are enlightened self-interest and utilitarianism. He declined an offer from Frederick the Great to settle in Berlin and also an invitation from Catherine II of Russia to undertake the education of her son. With Frederick, as also with Voltaire, he kept up a constant correspondence. He died in Paris, Oct. 29, 1783. See Encyclopedia.

Alembic (Arab. *al*, the; *anbig*, still). Apparatus of glass or metal for distilling. Now superseded, it consisted of a pear-shaped vessel, the *matrass*, which contained the substance to be distilled; a head or capital, another vessel imposed on the former to receive and condense the vapour; and, branching from it, the third part, a long inclined tube which carried the spirit into the receiver. See Retort.

Alemtejo (Portuguese, beyond the Tagus). Largest old province of Portugal. Bordered N. by the Tagus and S. by Algarve province, its area is 9,219 sq. m. Traversed by mts. and the Guadiana, Sado, and other rivers, it is varied in surface and climate. The fertile areas produce maize, rice, grapes, olives, and figs; copper, iron, and marble are found; there are several mineral springs; and pigs, horses, goats, and sheep are reared. The province, which is served by three main rly. lines, comprises the districts of Portalegre, Evora, and Beja. The chief towns are Evora, Elvas, Portalegre, Estremoz, and Beja. Pop. 669,766.

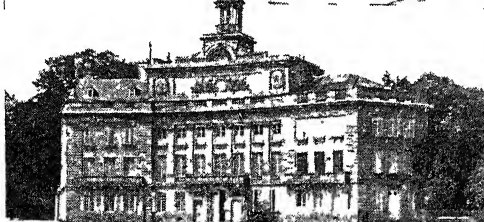
Alençon. Town of France. The capital of Orne department, it stands on the river Sarthe and is

67 m. by rly. S.S.E. of Caen. Its Gothic church of Notre Dame dates from the 16th century. The ramparts have been replaced by boulevards, and the remains of the castle, two 15th century towers, are used as a prison. Alençon was noted for its lace and also for its crystals and cut quartz, called Alençon diamonds, industries now decadent. It manufactures textiles, straw hats, artificial flowers, etc. Pop. 16,688.

The town gave its name to several lines of French nobles. The first count of Alençon was Yves, lord of Bellême, who fortified the town about 943. The second line sprang from the marriage in 1070 of Mabile, heiress of Yves II, to Roger of Montgomery, one of the companions of William the Conqueror, and became extinct with Robert IV, when it reverted

Anglo-U.S. forces invaded France in 1944, the Americans employed strong tank formations in their thrust N. from Le Mans, which, supported by powerful air cover, were reported to have by-passed Alençon on Aug. 12 in a lightning offensive to cut off the German 7th army, subsequently trapped in the Falaise "gap."

Aleppo (Gr. *Beroea*, Arab. *Haleb*). City of Syria. It is the capital of Aleppo sanjak, and lies in a fruitful valley watered by the Kuweik, 70 m. E. of the Mediterranean, on the Adana-Damascus Rly., and is also connected by rly.



Alençon. The town hall, and (above) remains of the 15th century castle of the dukes

to the crown. The countship was given as an appanage in 1268 to Louis IX's son Peter, and in 1293 to Charles of Valois, whose second son Charles, the founder of the third line, received it from his brother Philip. In 1367 the countship was converted into a peerage and in 1414 into a dukedom, which passed to the crown in 1525. In 1559 Catherine de' Medici received it as a dowry (one of her sons wooed Queen Elizabeth of England as duke of Alençon), and it was granted by Louis XIV to Gaston of Orleans, and later by Louis XVI to his brother Louis, afterwards Louis XVIII, in 1785. The title was borne by Ferdinand of Orleans, grandson of Louis Philippe.

During the German occupation of France, 1940-44, Alençon came under Nazi domination. When the

with Iraq. Through its port of Alexandretta (*q.v.*) it conducts a large foreign trade in silk, cotton, wool, damascened and leather goods, rugs, soap, tobacco, cereals, oil, wine, and fruit, and has a medieval castle, a citadel,

and several fine mosques. On the fall of Palmyra Aleppo became a great centre of trade between Asia and Europe. Several times besieged and sacked, it has also suffered by earthquakes and epidemics. During the First Great War the town was the headquarters of von Falkenhayn while commander-in-chief of the Turkish armies, and was occupied by the British on Oct. 26, 1918. During the Allied invasion of Syria in June-July, 1941, the German-controlled airfield at Aleppo was heavily bombed by the R.A.F. The sanjak extends between the Mediterranean Sea and the Euphrates. Pop. of city 320,167.

Alessandria. City and fortress of Italy. Situated on the Tanaro, 56 m. by rly. E.S.E. of Turin, it is the capital of Alessandria province and the seat of a bishop. It was



Aleppo. An ancient Syrian trade centre, Aleppo has suffered many vicissitudes, including sieges, earthquakes, and epidemics. The old fortress (right background) is set on an isolated hill. See p. 278

founded in 1168, and named after Pope Alexander III. In 1174, it withstood a six months' siege by Frederick Barbarossa. Ceded to Savoy in 1713, its citadel, built in 1728, was enlarged by the French in 1800-14 and destroyed by the Austrians in 1815. Its present cathedral dates from 1823 and its academy from 1562. Alessandria is an important rly. junction, and has manufactures of macaroni, linen, silk, woollen goods, and candles. Pop. 79,327. See Marengo.

Aletsch. Glacier of Switzerland, the most extensive icefield in the country. Formed chiefly of the snows of the Jungfrau and the Altschhorn, it is on the S. slope of the Bernese Alps and is nearly 13 m. long. The Aletschhorn, the second highest summit of the Bernese Alps, is 13,770 ft. high.

Aleutian Islands OR CATHERINE ARCHIPELAGO. Chain of about 150 islands extending in curved formation W. from the peninsula of Alaska. They cover a distance of 1,250 m. towards the Komandorskie (Commander Islands), off the E. coast of Kamchatka. The islands, most of which belong to the U.S.A. territory of Alaska, are bare and rocky, and contain numerous volcanic peaks, active and dormant. Unimak, nearest the mainland, and Unalaska are among the largest. Foxes, reindeer, dogs, and other mammals abound, but are decreasing in number; and the whale, seal, and otter fisheries are declining. The inhabitants are principally Aleuts, a branch of the Eskimo race, and belong to the Greek Church. The climate is moist and the temperature moderate. The islands were discovered by Bering and Chirikov in 1741.

In 1928 the McCracken-Stoll expedition found on one of the islands the mummified bodies of three adults and a child of the Stone Age. The bodies were in a perfect state of preservation. The clothing was intact, as were the

domestic articles, hunting weapons, and other paraphernalia which were buried with them.

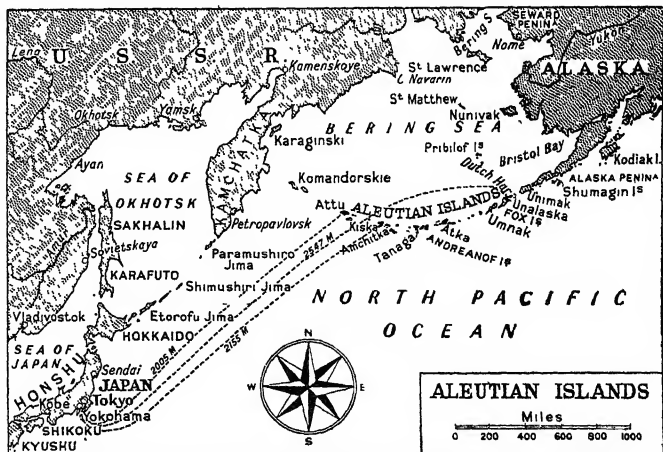
With the outbreak of war between the U.S.A. and Japan in Dec., 1941, possession of the Aleutians was immediately recognized by both sides as of immense strategic value. They form the shortest route across the Pacific to Japan, though Dutch Harbor, on Unalaska, used by the U.S. as a supply base, is 2,300 m. from Tokyo. Japanese invaders attacked Dutch Harbor in June, 1942, but were forced back by air attack. Nevertheless in the same month the Japanese established footholds on the westernmost islands of Kiska and Attu. They remained there for about a year, under regular observation and attack from the air. In May, 1943, U.S. troops landed on Attu and destroyed the Japanese garrison after a struggle lasting three weeks. The Japanese on Kiska, now outflanked, withdrew, and with the occupation of that island by U.S. and Canadian forces in Aug., 1943, the whole Aleutian chain not only came once more

under allied control but was developed as a base for offensive operations against Japan, with airfields and other military installations, at an earlier date and on a greater scale than if the Japanese had made no move in that region.

Ale Water. River of Selkirkshire and Roxburghshire, Scotland. It flows 24 m. N.E. and E. to the Teviot, is a trout stream, and has falls in its upper course.

Alewife. Small fish, occurring chiefly in the sea, rivers, and lakes of N. America. In length from 8 ins. to 10 ins., it is related to the shad and herring, resembling the former in colour and shape. In the U.S.A. it is used for food and is exported in large quantities. The name is due to a fancied resemblance to the alewife, a corpulent female beer-seller. French-Canadian fishermen call it gaspereau.

Alexander. The name of eight popes, the three most important of whom are noticed separately. Of the remainder, Alexander I was bishop of Rome A.D. 107-116, and was canonised as a saint. Alexander II was pope 1061-73; he was chosen owing to the influence of Hildebrand and was opposed by an antipope, Honorius II, whom at length he overcame. Alexander IV, pope 1254-61, failed in his attempt to unite the Greek and Roman Churches. He quarrelled with King Manfred of Sicily and the Ghibelline party, assigned the two



Aleutian Islands. Showing their strategic position in relation to Japan

Sicilies to Edmund of Lancaster, son of Henry III, and was driven to Viterbo, where he died. Alexander V was pope for less than a year, 1409-10, and had high repute as a scholar. Alexander VIII, pope 1689-91, bought for the Vatican the library of Queen Christina of Sweden.

Alexander III (d. 1181). Pope from 1159-81. Created a cardinal in 1150, Orlando Bandinelli of Siena was appointed papal chancellor in 1153 and was conspicuous as an opponent of the emperor, Frederick I. When he was elected pope, a rival was chosen by a minority of the cardinals as a nominee of the emperor, and during the ensuing struggle Alexander was twice driven from Rome. By the peace of Venice in 1177 the emperor, his chief foe, was compelled to recognize him, and kneeling before the pope received his pardon. Alexander III supported the cause of Becket against Henry II, and after that prelate's murder in 1170 made the English king do penance. He also presided over the third Lateran council of 1179,

when the law requiring a two-thirds majority of the cardinals for the election of a pope was passed. Just before his death, Aug. 30, 1181, again an exile from Rome, he excommunicated William the Lion and placed Scotland under an interdict.

Alexander VI (1431-1503). Pope from 1492 to 1503. By birth a Spaniard, being born in a village near Valencia in Jan., 1431, he was related through his mother to Alphonso de Borgia, or Borgia, who in 1455 became pope as Calixtus III. Taking this name in preference to that of his father, he was known as Rodrigo Borgia. He was made archbishop of Valencia and vice-chancellor by his uncle Calixtus, and cardinal by Sixtus IV. When Innocent VIII died in 1492, Borgia was a candidate for the vacancy, and by bribery on a large scale was chosen.

Before this event Alexander had become the father of five children by Vannozza dei Cattani—Caesar Borgia, three other sons, and Lucrezia. His object in life was to provide for these children, and, as

Ranke asserts, "how the pope would proceed, in regard to the marriages, endowments and advance of his children, became a question affecting the politics of all Europe." Caesar Borgia was even more unscrupulous than his father, and between them they worked for the destruction of their enemies, the increase of their own power, and the unity of Italy. The noble families who flourished on the papal territories, the Orsini and others, were attacked and stripped of their estates, while money was obtained in every possible way to be expended on art and literature, on government, and on pleasure. It was the period of the Renaissance, when even murder had its place among the arts.

In order to strengthen the papacy, Alexander mixed in the feuds which disturbed Italy. In 1493 he arranged a very powerful alliance against Naples, and while making terms with Charles VIII of France, when he invaded that country in 1494, he strove secretly to expel him, and at length, after forming a league against him, was successful. The ascendancy gained by Savonarola at Florence interfered with his plans, and after a contest the pope was victorious and the Dominican reformer was put to death. Alexander made use of the Inquisition for political ends, refusing to allow any persecution of the Jews in Rome, and issued in 1492 the bull which divided the New World between Spain and Portugal. When he died, of fever, Aug. 18, 1503, it was commonly believed, on quite insufficient evidence, that his end had been caused by drinking accidentally a goblet of poisoned wine, prepared by his commands for a cardinal who was his guest. See Renaissance in Italy, J. A. Symonds, 1875-86; History of the Papacy, Mandell Creighton, 1882-94.

Alexander VII (1599-1667). Pope from 1655-67. Fabio Chigi was born at Siena in 1599. Before his elevation he was secretary to Innocent X, and his rule was distinguished by his encouragement of literature and art and by the architectural improvements carried out at Rome. He came into collision with Louis XIV, and Avignon was lost to the papacy.

Alexander (1893-1920). King of Greece. Born Aug. 1, 1893, he was the second son of King Constantine and of his wife Sophia, a sister of the ex-Kaiser William II. When Constantine was compelled to abdicate, the Entente Powers signified their inability to recognize



Alexander VI. Rodrigo Borgia, who took the name of Alexander, was conspicuous for his unscrupulousness and for his patronage of the fine arts

Fresco by Pinturicchio in the Vatican



Alexander, king
of the Hellenes

The crown prince George, and Alexander was chosen in his stead. He ascended the throne, June 13, 1917, and died Oct. 25, 1920, from the bite of a pet monkey.

Alexander. Name of five kings of Macedonia, the third being Alexander the Great. Alexander I (498-454 B.C.), son of Amyntas I, accompanied Xerxes on his expedition against Greece. But his sympathies were with the Greeks, and before the battle of Plataea (479) he betrayed the positions of the Persian army. Greece gave him the name of Philhellen, and

admitted him to the Olympic games. Alexander II (369-367), the son of Amyntas II, after a successful campaign waged against Alexander of Pherae, engaged in a struggle with his half-brother, Ptolemy Alorites, by whom he was assassinated. Alexander IV, Aegus, was the posthumous son of Alexander the Great by Roxana. He was under the care of different guardians until 316, when he was imprisoned by Cassander, who put him to death in 311. Alexander V (297-294), son of Cassander, quarrelled with his brother Antipater about the throne, and accordingly sought the aid of Demetrius Poliorcetes. Before the latter arrived, the brothers were reconciled. Alexander was murdered by Demetrius, whose help he scornfully refused.

ALEXANDER THE GREAT: 356-323 B.C.

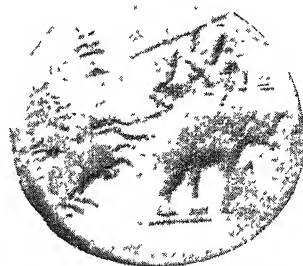
An account of the life of the famous conqueror, who established the first of the world's great empires. For related information see also Afghanistan; Alexandria; Greece; Macedonia; Persia; Phoenicia; Syria

Alexander the Great was the son of Philip II, king of Macedonia, whom he succeeded on his assassination in 336 B.C. Educated by Aristotle, he was richly endowed with natural abilities, physical strength, immense energy, and ambition, and he brilliantly distinguished himself when only sixteen at the battle of Chaeronea. He promptly displayed his quality

by crushing first the risings of his own northern tribes, then a threatened revolt among the Greeks.

Twelve months after Philip's death, his son's supremacy was completely established. Early in 334 Alexander crossed the Hellespont (Dardanelles) with an army, to carry out Philip's projected conquest of the Persian empire.

Darius of Persia, the "great king," was lord of all western Asia and of Egypt, though Egypt and the Greek cities on the coast were ready to break away from



Alexander the Great attacking Poros, King of India, (on an elephant) at the Battle of Hydaspes
From 4th cent. coin in British Museum

the Persian yoke. Vast hosts were under his control, but Alexander had at his disposal the famous Macedonian army and the Greek soldiery. His scheme of conquest was systematic and thorough, though it depended upon calculated audacity. Asia Minor, the hammer-head west of the Taurus mountain range, was his first objective, and his first task was to shatter at the river Granicus (334) the great force brought against him by the satraps or governors of the western provinces. His victory there secured prompt submission, but the Persians still held the seas. The western ports had to be secured before, in the summer of 333, he was completely master of Asia Minor.

Then Darius gave him his opportunity by advancing with an enormous host and occupying on the banks of the river Issus a position in which the bulk of his troops could not be brought into action, Alexander having already pierced the mountain passes of Cilicia. On the Issus in 333 the Macedonians won an overwhelming victory; Darius and his army fled, the royal family and vast spoils falling into the conqueror's hands.



Alexander the Great. On a great sarcophagus found at Sidon, now in Istanbul, carved reliefs executed shortly after Alexander's death show, among other scenes, the king leading his troops to victory over the Persians. In the portion reproduced here, Alexander (left) wearing the lion's skin of Heracles, engages a Persian cavalryman

From Hamdy Bey et Reinach, "Une Necropole royale à Sidon"

Alexander refused to treat with Darius except on terms of the latter's complete submission. But he was not to be tempted into a mere military raid. He proceeded methodically to the subjugation of Syria and Phoenicia. The port of Tyre defied him and endured a siege of many months. But Alexander was now in possession of a fleet. By its aid, and by unprecedented feats of engineering skill, the resistance of Tyre was at last overthrown; the port was captured, the citadel stormed, and by the end of 332 Syria and Phoenicia were under Alexander's undisputed control. Egypt tendered its submission without waiting to be conquered. While in Egypt Alexander laid claim to the divine descent which was attributed to the Pharaohs, and was declared—doubtless with a political purpose—to be the son of the god Ammon. Also with masterly political insight he selected the site for the city of Alexandria, which was soon to become the centre of Greek commercial supremacy in the Mediterranean.

Flight and Death of Darius

He was now ready to complete his conquest. In 331 he advanced upon Babylon, descending the valley of the Tigris. Darius, despairing of compromise, had collected an army larger even than that which had been routed at the Issus. At the battle of Gaugamela or Arbela (Sept., 331) the triumph of the Issus was repeated. Again Darius fled into Media. The conqueror swept on to Babylon and thence to the eastern capitals Susa and Persepolis, the treasure-house of the Persian kings. Thence he moved upon the Median capital, Ecbatana. Darius, though once more at the head of a considerable array, did not dare to face him. As he retreated his army fell away; presently he found himself virtually a prisoner in the hands of a band of traitors. Alexander, hot in pursuit, overtook the fugitive force, himself at the head of only a small troop of horsemen. The traitors slew Darius and again fled east themselves.

When Darius was dead there was none to dispute the title with Alexander. At six-and-twenty he was lord of the whole world, so far as it was known to the Greeks, E. of the Adriatic Sea. Beyond the Persian Gulf and the Caspian Sea the lands and peoples that lay eastwards were mainly the subjects of fable. Alexander organized the empire he had won, neither after the fashion of an eastern conqueror, nor after that of

westerns, who simply impose their own institutions on subject populations. Everything was to be in the hands of the supreme ruler. The provinces were placed under governors controlling different departments of state, so that none could easily act as an independent prince; but in each province of Alexander's empire its religious and traditional institutions were respected and maintained. In Babylon or Susa Alexander was an Oriental, in Egypt he was the son of Ammon, and in Hellas he was the descendant of Achilles. East and West were brought under one empire, not that one might dominate the other, but that they might become fused in the natural course of development.

But the work of organization did not check the career of conquest. Alexander claimed sovereignty



Alexander the Great
The Louvre, Paris

over all the tribes dwelling E. as far as the mountain rampart of India and its N. extension, which separates Chinese from Russian Turkistan, and as far N. as the river Jaxartes or Syr Daria. Between 330 and 327 a series of campaigns compelled to submission all the barbarian princes, chiefs, and tribes of those wild and hitherto almost inaccessible regions. Incidentally, Alexander took to wife Roxana, a barbarian princess, to the displeasure of his Macedonian followers.

Still the conquest of the East was not complete. Eastern Turkistan was hardly likely to be worth the effort, but beyond the barrier south of it lay India. Enough of India was known, at least by the Persians, to attract Alexander's ambition. Already he had planted one of his many cities of Alexandria in the modern Afghanistan.

In the spring of 326 he led his army through the mountain passes, descended upon the Indus, and crossed over the river unopposed, entering the Punjab. Behind the Hydaspes (Jelum), however, one of the great Punjab princes, the bearer of a royal title rendered by the Greeks as Poros, had gathered a great force to resist the invader. Alexander, by an enveloping movement, carried across the river troops that turned the flanks of the native army, and it was routed. Poros himself was taken prisoner, having fought valiantly to the last; he won the conqueror's favour and was allowed to remain on his throne, though as Alexander's vassal and tributary. But beyond the Hyphasis (Sutlej), the farther boundary of the Punjab, even the loyal Macedonians refused to go. Alexander had reached the eastern limit of his empire.

Military Conquests and Commerce

But the men were ready enough to complete the conquest of the Punjab itself and the valley of the Indus. When that work was accomplished, Alexander dispatched an exploring expedition by sea along the coast from the mouth of the Indus to the Persian Gulf, with a view to commercial developments, which the genius of Alexander in no wise ignored, as he had already shown by the founding of the Egyptian Alexandria. It only remained to subdue Arabia, and then the empire, having as its southern boundary the coast from the Red Sea to the Indus, would have the whole Indian Ocean open to it. Alexander himself returned to Persepolis by way of Gedrosia, the modern Baluchistan. In 325, after the Oriental fashion, he took to wife Statira, the daughter of Darius, and he encouraged or compelled a number of similar unions between his Macedonian followers and noble ladies of the East. In this year and the next campaigning was suspended. Alexander was occupied partly in organization, partly in pageants and demonstrations intended to emphasise the might and majesty of the new empire. It can hardly be doubted that if he had lived but a few years longer he would have turned his face westward to seek farther conquests. But in 323 he projected the rounding off of his Asiatic dominion by the subjugation of Arabia. He was on the point of starting on that expedition when at Babylon he was stricken with fever. On the eleventh day—June 29—the mighty conqueror was dead.

Death at the age of thirty-two was a catastrophe for which no preparation had been made in Alexander's scheme of empire. The great fabric he had reared depended for its permanence on the continued control of a supreme genius; after a time the supreme genius would have become unnecessary, provided that the supreme authority was both universally recognized and capable. But no provision had been made for an adequate supreme authority to take the place of Alexander in case of his death. There was no heir to his sceptre except an infant, no minister of the great conqueror who could assume and exert an undisputed authority. The inevitable result of Alexander's premature death was the disintegration of the new empire, which in effect took the form of its division among the most powerful of his generals and lieutenants, who with their successors are commonly called the Diadochi.

It is not easy to realize the vast imaginative genius of the man who conceived the idea, not merely of leading victorious armies from one end to the other of the whole known world, like a Jenghiz Khan or a Tamerlane, but of fashioning the whole known world into a single vast community, homogeneous in one of its aspects, yet recognizing differentiations of race and of customs; an idea which has more nearly reached fulfilment in the British empire than in any other that the world has known, even including that of Rome. And in Alexander this imaginative genius was joined on the one side with the extremely practical statesmanship which made sound political organization attend immediately upon conquest, and on the other side with the strategical insight which patiently secured the whole eastern seaboard of the Mediterranean before it permitted an advance into the heart of Asia. And even beyond this we find Alexander giving the utmost effect to the tactical principles evolved by his greatest predecessors in the art of war and to the scientific conduct of siege operations almost without precedent. All this is obscured to most of us because our own imaginations are so much more impressed by certain of Alexander's picturesque aspects, his feats of personal daring, the traits of knightly chivalry or of human weakness and passion, which were so marked in his character, and the moral his life suggests concerning the vanity of human ambitions.

In the Middle Ages Alexander,

like many other heroes of antiquity, had acquired a highly mythical character, while his actual historical achievements were obscured. All manner of traditions and legends were transferred to him. The romance of Alexander, apparently first formulated in Egypt in the 2nd century A.D., popularised in a Greek version known as the work of the pseudo-Callisthenes, and latinised by Julius Valerius in the 3rd century, established itself as a predecessor of the Arthurian and Charlemagne legends. The most popular version is the 10th century work, *Historia de Preliis*, attributed to one Leo of Naples. There were versions in every European language—while the Persians and Arabs had their own variations on the exploits of "Iskander." The Alexander of the romance is the conqueror of Western Asia, of India, of Africa, and incidentally of the Amazons and of Italy and Britain. He was son, not of his putative father Philip, but of an Egyptian wizard, Nectanebus. Medieval magic, enchanters, dragons, and so forth, enter largely into the legend.

A. D. Innes
Bibliography. Plutarch's Life of Alexander the Great, various translations; Invasion of India by Alexander, J. W. MacCrimmon, 1893; Alexander the Great, B. I. Wheeler, 1900; Alexander the Great, U. Wilcken, 1932; Alexander the Great, A. Weigall, 1933; Alexander the Great, F. A. Wright 1934.

Alexander I (1777-1825). Tsar of Russia. Son of the tsar, Paul I, and a German princess, he was



Alexander I,
Tsar of Russia

born Dec. 23, 1777, and succeeded to the throne on his father's murder in 1801. He held liberal ideas, had a high sense of duty, and a conviction that monarchs were clothed with divine authority. Reversing his father's policy, Alexander made a convention with Great Britain, but sought also to act in concert with Napoleon, whom in reality he distrusted, and from whom he broke after the murder of the duc d'Enghien, 1804.

While Austrians and Russians were preparing for war Napoleon swooped down upon the Austrians at Ulm and shattered the combined armies, mainly Russian, at Austerlitz, Dec. 2, 1805. Next year, Oct. 14, Prussia was broken at Jena. Alexander gave an asylum to the Prussian king, but

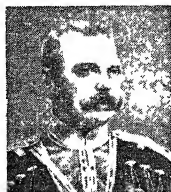
after fighting two great battles at Eylau and Friedland he concluded in July, 1807, the treaty of Tilsit with Napoleon, in revenge for what he deemed the desertion of England and the futility of Austria. But he joined only half-heartedly in Napoleon's Continental System, directed against the admission of British goods into Europe. He saved Prussia from complete dismemberment by Napoleon, permitted rather than helped the overthrow of the Austrians at Wagram, July 5-6, 1809, turned a cold shoulder to Napoleon's proposals for marrying a Russian princess, and finally opened his ports to British commerce. War—Napoleon's disastrous Moscow adventure—followed in 1812. In 1813 Russia took a leading part in the uprising of Europe against the Napoleonic domination, which ended in 1814 with Napoleon's fall and his relegation to Elba.

Alexander now took the lead, supported by England, in securing liberal treatment for France and in organizing the Congress of Vienna for the settlement of Europe. The negotiations were interrupted by the Hundred Days, and after the final overthrow of Napoleon at Waterloo Alexander, with Wellington, resisted a vindictive policy towards France. But in the settlement of Europe Alexander's action was the curious product of two groups of ideas, which in existing conditions were wholly irreconcilable—his peculiar conception of autocracy and his sympathy with aspirations for liberty. By the latter he was moved to concede a constitution to his kingdom of Poland, while by the former he was led into creating the Holy Alliance.

This, however, reacted upon the tsar's domestic policy, destroying its old liberal character and making it repressive. So also in his later years, when Russians as well as British and French were watching with passionate sympathy the Greek struggle for independence, Alexander was found denouncing it as rebellion against legitimate authority. Yet to the last he cherished in his own mind the belief that he was a sincere champion of liberty. At the moment of his death, Dec. 1, 1825, a conspiracy had been formed against him which his brother, Nicholas I, had to suppress. See Holy Alliance; Vienna, Congress of.

Bibliography. Modern Europe, C. A. Fyfe, 1880-9; Revolutionary Europe, H. Morse Stephens, 1893; Modern Europe, W. Alison Phillips, 1901; History of Russia from the Birth of Peter the Great to the Death of Alexander II, W. R. Morfill, 1902.

Alexander II (1818-81). Tsar of Russia. Son of Nicholas I, he was born April 29, 1818, and



Alexander II,
Tsar of Russia

succeeded his father March 2, 1855. Nicholas had been, in the political sense, a most uncompromising reactionary. Alexander, on the other hand, was not without those generous impulses which had characterized his uncle, Alexander I. In spite of his measure for the emancipation of the Russian serfs in 1861, and his display of liberal sympathies in other ways, the despotic and arbitrary methods of Russian government remained fundamentally unchanged, and the revolt of Poland in 1863 was mercilessly crushed. In 1877, as in 1854, when the Powers refused to interfere on behalf of the Christian subjects in the Turkish empire, Russia intervened and the war which followed was ended by the treaty of San Stefano, which in its turn was set aside by the treaty of Berlin (1878).

The tsar's reign witnessed that expansion of Russia in Central Asia which was regarded by the British as a menace to the empire in India. During his later years there was a great development of the revolutionary or Nihilist party in Russia, generated by the merciless methods of the government. This led, after several attempts upon the tsar's life, to his murder on March 13, 1881, by a bomb flung beneath his carriage. *Consult Life, S. Graham, 1935.*

Alexander III (1845-94). Tsar of Russia. Younger son of Alexander II, and born March 10, 1845, Alexander became heir to the throne on the death of his brother Nicholas in 1865. His reign was marked by the repression of all liberal ideas, persecution of the Jews, and determined attempts to force the Russian language and Russian ideas on subject peoples. Alexander's life was often threatened by the Nihilists, but he died a natural death, Nov. 1, 1894.

Alexander I (c. 1078-1124). King of Scotland. Son of Malcolm Canmore and Margaret, an Anglo-Saxon princess, he passed some of his early years in England and became King of Scotland when his elder brother Edgar died 1107. During his reign the S. part of the kingdom was almost independent, being ruled by Alexander's young brother David, later David I.

Alexander was a great benefactor to the church. He died April 27, 1124.

Alexander II (1198-1249). King of Scotland. The son of William the Lion, whom he succeeded in 1214, he was lord of considerable estates in England and helped the barons to procure Magna Carta from King John. In 1216 he was at war with John, but after the latter's death he married his daughter Joan. He died on the island of Kerrera, July 8, 1249.

Alexander III (1241-86). King of Scotland. The son of Alexander II by his second wife Mary de Couci, he became king when eight years old. In 1251 he was married at York to Margaret, eldest daughter of Henry III of England. In 1263, by defeating Haakon V at Largs, he ended the Norwegian claim to the Hebrides. He was killed when his horse fell over a cliff near Kinghorn, Fife, March 12, 1286.

Alexander I (1876-1903). King of Serbia. The son of King Milan, who abdicated in 1889, he was proclaimed king under a regency, and assumed the kingship in 1893. In 1900, amid universal opposition, he married Draga Mashin, who had been one of his mother's ladies-in-waiting, and in March, 1903, arbitrarily suspended the constitution. A palace conspiracy was the result, and Alexander and his queen were assassinated June 11, 1903.

Alexander I (1857-93). Prince of Bulgaria. The second son of Prince Alexander of Hesse, he was born at Verona, April 5, 1857, and served in the Russo-Turkish war of 1877-78. At the instance of Alexander II of Russia, he was elected first prince of Bulgaria. April 29, 1879. He aroused Russian and Serbian opposition in 1885 by aiding the revolt in E. Rumelia and bringing about its union with Bulgaria. He defeated the Serbs in the field, but on Aug. 20, 1886, as the result of Russian intrigue, was compelled to abdicate, and was abducted to Russian territory. A counter-revolution ensured his quick return to Sofia, but finding Russian, Austrian, and German opposition too powerful, he formally resigned on Sept. 7. As Count Hartenau, he retired to Darmstadt and died at Graz, Styria, Nov. 17, 1893. *See Bulgaria, History.*

Alexander (1888-1934). First king of Yugoslavia. Born at Cetinje, Dec. 17, 1888, second son of King Peter of Serbia, he took the oath as heir apparent March

27, 1909, when his elder brother George renounced his right of succession. He distinguished himself in the wars of 1912-13 against Turkey and Bulgaria, and was nominally the commander-in-chief of the Serbian army in the First Great War. Proclaimed king of Yugoslavia Aug. 19, 1921, he married Princess Marie of Rumania, June 8, 1922. Racial and political dissension disturbed his reign, and in 1929, despairing of settling it in any other manner, he suspended the constitution and became in effect dictator. He was assassinated by a Croat terrorist while driving through Marseilles in company with Louis Barthou, the French foreign minister, on Oct. 9, 1934, and was succeeded by his son, Peter (*q.v.*).

Alexander, THE PAPHLAGONIAN (*fl.* 167). Greek impostor. He was born at Abonouteichos, in Paphlagonia, and studied medicine. Afterwards he gave out that he was a descendant of Perseus, and established himself as an oracle-monger. He is described by his contemporary Lucian in his *Alexander or Pseudomantis*.

Alexander, ALBERT V. (b. 1885). British politician. Born at Weston-super-Mare, May 1, 1885, son of an artisan engineer, he was educated at Barton Hill elementary school, Bristol, and at technical classes. He became a member of the staff of the Somerset county education committee, served in the army



A. V. Alexander,
British politician

during the First Great War, and was for many years a Baptist lay preacher. From 1922-31 he was Co-op. M.P. for the Hillsborough division of Sheffield, and again, as Labour M.P., from 1935. He was First Lord of the Admiralty in the Labour government of 1929-31 and in the first Churchill administration of 1940-45, and was reappointed to the same office in the Labour government formed in 1945. In Oct., 1946, he became minister without portfolio and in Dec. minister of defence. He was made C.H. in 1941.



Alexander, King of
Yugoslavia

Alexander, SIR GEORGE (1858-1918). British actor. The son of a Scottish manufacturer, he became a professional actor in 1879. In 1880 he joined Irving's Lyceum company, and during the greater part of the next eight years played under that great actor. In 1889 he took a theatre of his own, the Avenue, and two years later removed to the St. James's, where he



Sir G. Alexander,
British actor
Lillott & Fry

remained for the rest of his life. In 1911 he was knighted. He died at Chorley Wood, Herts, March 16, 1918. As an actor Alexander was best in fashionable modern comedy. The parts he made particularly his own were those of the well-dressed man about town, although he had a marked success as Rudolph Rassendyll in *The Prisoner of Zenda*. Among his most successful productions were *The Second Mrs. Tanqueray*, *His House in Order*, *Lady Windermere's Fan*, *The Importance of Being Earnest*, and *Old Heidelberg*. Consult Sir George Alexander and the St. James's Theatre, A. E. W. Mason, 1937.

F.-M. VISCOUNT ALEXANDER

Maj.-Gen. Sir Charles Gwynn, K.C.B., D.S.O.

This article reviews the career and achievements of a great British soldier. See also Burma Campaign; Dunkirk; Italy in the Second Great War; North Africa Campaigns; and biographies of Eisenhower and Montgomery

By common consent Harold Rupert Leofric George, first Viscount Alexander of Tunis, won a reputation unsurpassed by any general in the Second Great War. One must go back to Wellington and Marlborough to find his equal among British generals of the past. An Irishman, like many other famous British soldiers, third son of the 4th earl of Caledon of Castle Caledon, Co. Tyrone, he was born Dec. 10, 1891, educated at Harrow and Sandhurst, and commissioned in the Irish Guards, Sept., 1911.

Still a junior subaltern, he went to France with his regiment in 1914 and quickly made his mark as a leader of exceptional promise. Promotion came quickly, and during the last eighteen months of the war he commanded his battalion as an acting lieutenant-col. He was twice wounded, and five times mentioned in dispatches, with the D.S.O. and M.C., and a brilliant career clearly lay ahead. In 1919, specially employed with missions to Poland and Russia, for a year he commanded the Baltic Landswehr, thus gaining his first experience in command of foreign troops. Returning to England in 1922, he was promoted lieutenant-col. at the exceptionally early age of 31. Having completed his three years in command of his battalion, he then went as a student to the Staff College—a unique case—and although he graduated brilliantly, he asked at the end of his course to be employed on the staff in a lower grade than was due to his

rank, in order to gain experience of junior staff duties. This characteristic wish was met, but not until he had held a full colonel's appointment and had completed his military education at the Imperial Defence College, where selected officers of the three fighting services and some civil servants collaborate in the study of the concrete problems of combined staff work.

Having thus completed his military education, Alexander held staff appointments in England before going to India to command a brigade. There he gained experience of frontier mountain warfare, was awarded a C.S.I., and made contact with Indian native troops. Promoted major-general at the age of 46, he returned to England to command

the 1st division at Aldershot—the most coveted major-general's command in the army.

He took his division to France in 1939. That his powers of leadership inspired confidence was proved by his selection to take charge of the final stages of the evacuation from Dunkirk, May, 1940. His coolness and imperturbability did much to sustain the morale of the troops in the ordeal on the beaches, and to see their general in his moments of relaxation building sand castles calmed the nerves of men waiting for the next bomb or next boat.

Dunkirk was only the first of three "untidy" situations Alexander had to handle. The next was in Burma, whither he was rushed, now a general, in 1942 to become G.O.C. of an outnumbered and shattered army. His extrication of this force from an apparently hopeless position by a fighting retreat from Rangoon to the mountains of the Indian frontier was an outstanding achievement.

Hardly had the retreat from Burma ended when his appointment to be C.-in-C. Middle East called him to another untidy situation. Gen. Auchinleck, after the disaster in Libya, had halted Rommel's pursuit at Alamein, but it was a disorganized if not a demoralized army that stood to protect Alexandria. Mr. Churchill judged that new blood was needed not only to carry through the urgently needed reorganization but also to restore the confidence of the troops.

Great as was Montgomery's part in the battles of Alamein, in the long pursuit, and in the battles of the Mareth line and Akarit, it must be remembered that Alexander throughout was the responsible chief, and at Alamein was directly concerned in the planning and conduct of the battles.

Appointed after Alamein to be deputy to Gen. Eisenhower and to command the 18th army group composed of the 1st and 8th British armies, an American corps, and a French contingent, he became operational commander in Tunisia. His personal intervention to retrieve a dangerous situation when Rommel counter-attacked his American corps, and his brilliant and bold planning and conduct of the final battles in the spring of 1943, which inflicted humiliating and annihilating defeat on von Arnim, only confirmed his reputation as a masterly commander in action.



Alexander

For the capture of Sicily and the subsequent Italian landings his responsibility is not so clearly defined; as commander of the army group he took a great part, but Eisenhower was still in supreme command, and in amphibious operations it is difficult to apportion credit.

With the departure of Eisenhower to take charge of the main offensive in the west, Alexander was left solely responsible for the campaign in Italy, which had to be conducted under most adverse conditions of terrain and climate against some of the best troops commanded by one of the best generals Germany could produce. Furthermore, the advisability of collecting experienced allied troops and commanders for the great enterprise in Normandy inevitably necessitated transfers from the Italian theatre. It became not the least of Alexander's tasks to weld troops of many nationalities and of varying experience into an efficient army. How successfully he accomplished it was proved when he broke Kesselring's formidable Gustav position and captured Cassino. A bold transfer of formations from his right to reinforce his left and the skilful assignment of tasks to suit the characteristics of his troops of different nationalities contributed greatly to the victory. The capture of Rome, practically intact, resulted two days before D-day in Normandy, and brought its captor a field-marshal's baton.

Although Alexander drove the enemy from many strong positions and finally broke Kesselring's Gothic line, he was unable with his army, now further depleted, to achieve decisive victory before the winter of 1944. But with the spring he was able to synchronise his final blow with the main Allied offensive. Vittinghoff, Kesselring's successor, driven from his strongest positions, gave the Empire the satisfaction of seeing a British commander the first to enforce terms of unconditional surrender.

What were the attributes that brought Alexander his practically unbroken record of success? Undoubtedly he possessed to a high degree all the natural qualities of a soldier: physical and moral courage, a cool disposition, a capacity to arrive at quick decisions, and a tough physique. He had spared no pains to develop his natural qualities by as complete a military education as he could obtain. But in addition he displayed qualities of character

which, without apparent effort on his part, influenced the outlook and conduct of all associated with him. Full of quiet self-confidence, he had no need to assert himself or to seek the limelight. This, combined with charm of manner, enabled him to exercise authority with a minimum of friction and opposition. He thus was an ideal deputy for Eisenhower in the all-important task of establishing Allied military unity.

The announcement was made in July 1945, of Alexander's appointment as governor-general of Canada. He was created a viscount in the New Year honours list, 1946, and in May he arrived in Ottawa.

Alexander Nevsky (1220-63). Russian saint and warrior. Second son of Prince Yaroslav of Novgorod, he led the Russian forces against the Germans, Poles, Danes, and Swedes, and derived his surname from the defeat he inflicted on the Swedes on the Neva in 1240. He spent much of his life in seeking to improve the condition of the poor, who had been harassed by Tartar invasions, and after his death on Nov. 14, 1263, was canonised by the Orthodox Church. A great monastery and the order of S. Alexander Nevsky were founded in his honour by Peter the Great. A Soviet film depicting his victory over



Alexanders, celery-like wild flower

the Teutonic knights on Lake Peipus in 1242 was shown in Great Britain in 1942.

Alexanders (*Smyrniolum olusatrum*). Biennial herb of the family Umbelliferae. It was used as a potherb from ancient times until the more extended cultivation of celery, which has supplanted it. It is a native of the Mediterranean region, but is now wild in many parts of Europe, including Britain, especially near the coast. Its flavour resembles that of celery, but is much stronger and less pleasant. It bears numerous minute yellow flowers in round-topped umbels in the spring.

Alexander, SAMUEL (1859-1938). Australian-born British philosopher. Born at Sydney, New South Wales, Jan. 6, 1859, of Jewish parents, he was educated at Melbourne university and Balliol College, Oxford. From 1893 to 1923 he was professor of philo-

sophy at Victoria University, Manchester. He was awarded the O.M. in 1930, was a fellow of the British Academy, and was several times president of the Aristotelian Society. Space, Time, and Deity (2nd impression, 1927) is regarded as his masterpiece; other works include Spinoza and Time, 1921; Beauty and Other Forms of Value, 1933. He died unmarried at Withington, Manchester, Sept. 13, 1938.

Alexander Severus (205-235). Roman emperor from 222 to 235. The son of Julia Mamaea, he was adopted by a cousin, the emperor Elagabalus, and placed on the throne when Elagabalus was murdered. In 232 he defeated the Persian king, Artaxerxes, who had



Alexander Severus, Roman emperor

attempted to encroach upon the eastern boundaries of the empire. While on a campaign to repel a German invasion of Gaul, he was murdered by Maximinus, who succeeded him. Just and tolerant, Alexander Severus was distinguished for his love of learning and virtuous life.

Alexandra (1844-1925). Queen-consort, wife of King Edward VII of Great Britain and Ireland. Born at Copenhagen, Dec. 1, 1844, and baptized Alexandra Caroline Marie Charlotte Louise Julie, she was the eldest daughter of Prince Christian of Schleswig-Holstein-Sonderburg-Glücksburg, heir to the throne of Denmark. In 1863, the year of Alexandra's marriage, Christian became king of Denmark.

Albert Edward, prince of Wales, met Alexandra once or twice in Germany in 1861. He was her senior by three years. In 1862 Queen Victoria met the princess for the first time near Brussels. Shortly afterwards a formal proposal was made. On Sept. 9, 1862, the two were betrothed, and on March 10, 1863, they were married in S. George's Chapel, Windsor. They settled down at Marlborough House and Sandringham.

The princess of Wales gave birth to her first child, a son, Albert Victor, at Frogmore, on Jan. 8, 1864. Two sons and three daughters followed. At the end of 1871 the princess nursed her husband through his memorable

illness. The early years of Alexandra's married life had been taken up with domestic matters, but in 1868 she and the prince went abroad. After their return the princess began to take a more active part in the social life of the country of which she and her husband were, owing to Queen Victoria's secluded life, the leaders. Between 1871 and 1901 the princess of Wales fulfilled with remarkable success the duties of her high station. Her gracious manner and her real interest in the people made her popular everywhere.

In Jan., 1901, the prince succeeded to the throne, and Alexandra was crowned in Westminster Abbey as queen-consort by the archbishop of York, Aug. 9, 1902. As she had been as princess so she was as queen, and her charm and popularity remained unimpaired.



She did not often share the king's continental journeys, but she regularly visited Copenhagen, having always kept up the most friendly relations with her own kinsfolk; indeed, as her own home life showed, she possessed the domestic virtues to an unusual extent. In 1910 Edward VII died, and Alexandra, thereafter known officially as the queen-mother, returned to Marlborough House and received an annual income of £70,000. She died Nov. 20, 1925, and was buried beside King Edward in St. George's Chapel, Windsor. Over £230,000 was raised as a national memorial to her, and this was expended on the development of district nursing, the provision of pensions for queen's nurses, and the erection of

a statuary group in bronze outside Marlborough House. See Queen Alexandra, Sir G. Arthur, 1934.

Alexandra (1872-1918). Tsaritsa of Russia. Born June 6, 1872, she was the daughter of Louis IV, grand duke of Hesse, and a granddaughter of Queen Victoria. She changed her name from Alix to Alexandra Feodorovna at her marriage on Nov. 14, 1894. Her husband having become Tsar Nicholas II a few days previously. A powerful and determined character, she dominated her husband with her reactionary views, but was herself under the influence of Rasputin (*q.v.*) from 1907, being frequently in a state of exaltation in which she sought the guidance of Providence. She continually interfered in the choice of ministers until Rasputin was murdered at the end of 1916.

When the tsar abdicated on March 15, 1917, Alexandra went with him, and at Ekaterinburg (now Sverdlovsk), July 16, 1918, she was shot with him and their son and four daughters. Consult Letters of the Empress Alexandra Feodorovna to the Emperor Nicholas II, 1932; The Real Tsaritsa, by Lili Dehu, 1922.

Alexandra, of Kent (b. 1936). British princess, daughter of H.R.H. the duke of Kent (1902-1942) and Marina, duchess of Kent. Born on Christmas Day, 1936, the second child of her parents, her full names are Alexandra Helen Elizabeth Olga Christabel.

Alexandra Day, or ROSE DAY. Observed towards the end of every June, and named in honour of Queen Alexandra. It was first celebrated in 1912, the 50th year of Queen Alexandra's residence in England. Artificial roses, made by the blind and crippled, are sold in the streets, the profits being distributed among hospitals, convalescent homes, and kindred institutions. In 1944 the total raised was a record sum of £185,000.

Alexandra Palace. London place of amusement. Situated on a ridge in Alexandra Park, Muswell Hill, N. London, 6 m. from Charing Cross, it was opened May 1, 1875. It occupies about 7 acres. The Grand Hall, containing a fine organ, seats 12,000 persons and the orchestra 2,000, while the concert hall can accommodate 3,500 and the theatre 3,000. The palace, named after Queen Alexandra, is the second of its name. The first, opened May 24, 1873, was entirely gutted by fire on June

9 following. After being closed for some time the present structure and land were bought for £150,120 by the Middlesex and other county councils, and opened free to the public May 18, 1901. During the First Great War the palace was used for the internment of German prisoners, and since then the buildings had fallen into some neglect, until the B.B.C. opened television studios there in



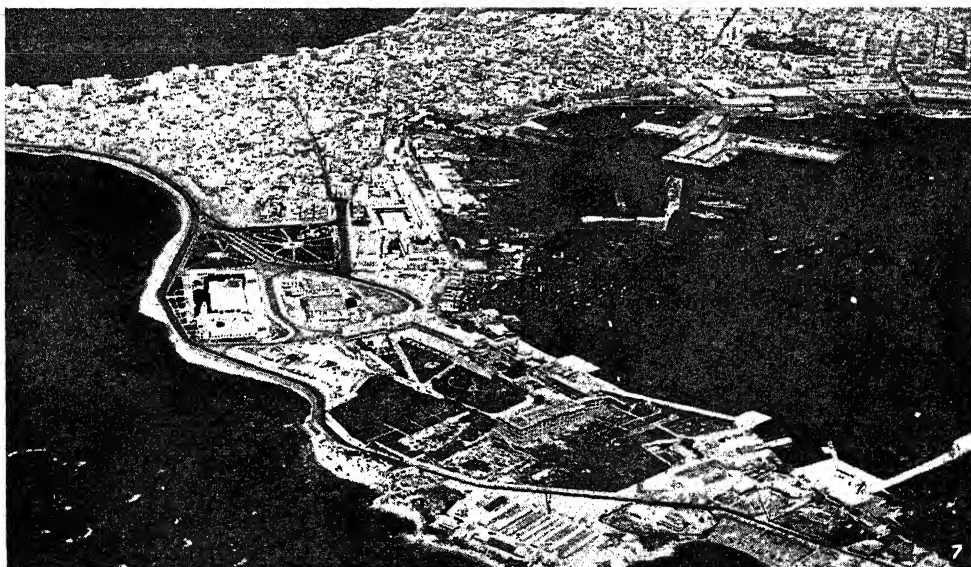
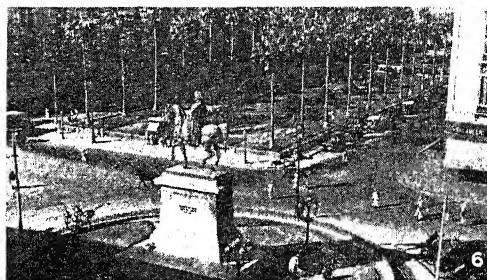
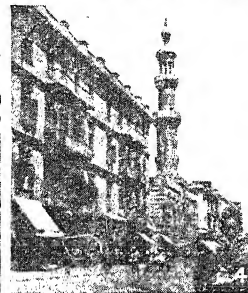
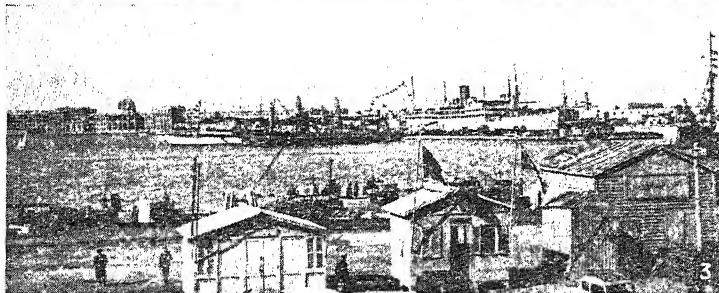
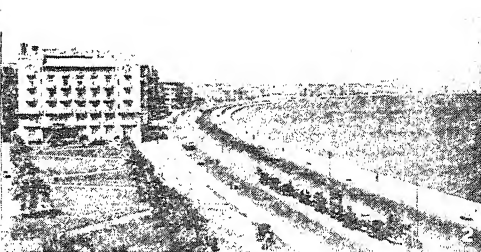
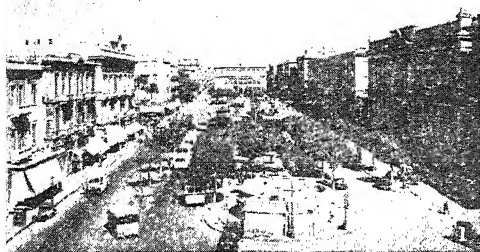
Alexandra Palace. Aerial of television transmitter of 1939 on N.E. corner tower

1936. A television transmitter aerial 220 ft. high was added to the N.E. tower. The park, in which a racecourse is laid out, covers 480 acres.

Alexandretta. Seaport of Turkey, in the vilayet of Hatay. It is known also as Skanderoon, from its Turkish name of Iskanderun, and lies on the E shore of the gulf of Alexandretta at the extreme N.E. of the Mediterranean. The terminus of a branch line of the Adana-Aleppo Rly., it is about 70 m. N.W. of Aleppo. Anciently called Alexandria ad Issum, it was founded by Alexander the Great to commemorate his victory at the Issus, 333 B.C. Here Sir Kenelm Digby defeated a Franco-Venetian force in 1628 and Mehemet Ali won a victory over the Turks in 1832. In the First Great War it was occupied by British and French troops, Nov. 9, 1918. It is the port for Aleppo (*q.v.*), has a fair harbour, exports wool, leather, hides, nuts, silk, and copper in considerable quantities, and is a busy commercial centre. After the Turkish collapse in 1918 Alexandretta was included in the Syrian republic, and in 1937 became an autonomous sanjak, the name being officially changed to Hatay in 1938. But in 1939 the sanjak was formally returned to Turkey. Pop. 13,997. The Gulf of Alexandretta is a N.E. arm of the Mediterranean.

J. A. Todd, M.A., Author of The Banks of the Nile
In this article is the varied story of the city founded over two thousand years ago by the Macedonian conqueror after whom it was named. Further information is given under the headings
Abukir; Arabi, Ahmed; Egypt; Turkey, etc.

Alexandria. Plan of the modern seaport, which has more the character of a smaller Marseilles than that of an Oriental city



1. Mehemet Ali Square; at the far end is the Exchange.
2. Queen Nazli Avenue, with Obelisk Square on the left. 3. View of the port showing large mail steamers at the quays and one of the royal palaces on the left.
4. Minaret in the bazaar quarter. 5. Nebi Daniel

mosque. 6. Statue of Mehemet Ali (1769-1849), governor of the Sudan; beyond is Saad Zaghlul Square. 7. Air view showing, right, the modern western harbour, partly formed by a breakwater 2 miles in length; top left, the old eastern harbour

ALEXANDRIA: BLEND OF OLD AND NEW IN EGYPT'S GREAT MEDITERRANEAN PORT

the British bombardment of the town on July 11 of the same year. The sacking of the town by Arabs defeated followers in their flight laid a great part of the European quarter in ruins, and rendered necessary the rebuilding of the central area surrounding the Mehmet Ali Square. Since then the main features of the development of the city have been the extension of the harbour and the growth of large suburban quarters mainly occupied by Europeans. The city also forms the summer headquarters of the government, because its sea breezes render it more tolerable than the hot dry climate of the capital. The climate, however, is very dry for a sea-coast town, the rainfall being only about 8 ins. per annum.

The Native City

There is little of beauty or interest in the modern town. The native city is mostly crowded together on the site of the old Heptastadium, which, by the accumulation of centuries of silt and the characteristic Egyptian habit of throwing household refuse out of doors, has become about a mile wide. This promontory, known as Ras-et-Tin, separates the old eastern harbour, now only used by fishing boats, from the great modern or western one.

Alexandria is linked by rly. to Cairo and Suez, and by canal with the Nile; and the city is now the centre of the export and import trade of Egypt. The western harbour consists of an inner harbour of 464 acres and an outer harbour of 1,400, and is partly formed by a breakwater 2 m. long. The chief exports are raw cotton, grain, rice, and sugar.

In the Second Great War, Alexandria became the chief British naval base in the Middle East. In compliance with a treaty of 1936 whereby Britain retained an army of 10,000 troops and 400 aircraft in the zone of the Suez Canal, Egypt put the port at the disposal of the British Fleet. Before the collapse of France in 1940 a large part of French naval strength was also concentrated at Alexandria. On July 3, 1940, all French warships lying at Alexandria, consisting of a battleship, four cruisers, and some small ships, were demobilised by the British after peaceful negotiations with the French commander, Admiral Godefroy. The first of many Axis air raids on the city and port was made on June 22, 1940. That of June 7, 1941, did considerable damage, casualties amounting to



Alexandria. Pompey's Pillar, a great monolithic shaft in red granite on the site of the Serapeum

400. During the summer of 1942 the Axis threat eastwards from Libya directly menaced Alexandria and focused the attention of the world upon the city. Rommel's forces reached a line only 60 m. W. of Alexandria, and it was said that Mussolini was ready to ride into the city in triumph. The British victory of Alamein lifted the threat. All British forces had left Alexandria by Feb. 14, 1947. Pop. 925,081.

Alexandria. Town of Dumbartonshire, Scotland. On the Leven, 3 m. N. of Dumbarton by railway, its importance is due to cotton-printing, bleaching, and dye works. Pop. 10,359.

Alexandria. Town of Rumania, on the Wallachian Plain, in the department of Bucegi. It is the centre of a fertile wheat-growing district and is situated on the river Vedea, about 30 m. above its junction with the Danube, and some 50 m. S.W. of Bukarest. The town was founded by Prince Alexander John Cuza, after whom it was named. Pop. 19,387.

Alexandria. City of Louisiana, U.S.A., the capital of Rapides co. Standing on the Red River, about 193 m. N.W. of New Orleans by the Texas and Pacific Rly., it is a manufacturing centre, and trades in cotton and sugar. Here there was an Indian village, and the city, which obtained municipal rights in 1819, grew out of a trading station. It was named after Alexander Fulton, who was responsible for its settlement by whites in 1785. Pop. 27,066.

Alexandria. City and port of entry of Virginia, U.S.A. It is

100 m. from the mouth of the Potomac river and 7 m. S. of Washington. The city engages in chemical and other manufactures and has a good harbour, navigable by large vessels. An impressive landmark is the tall tower of the George Washington masonic memorial. Old Christ Church is an 18th century edifice in which George Washington worshipped. Pop. 33,523.

Alexandria, BATTLE OF. Fought between British and French, March 21, 1801. Napoleon's troops had seized Alexandria in 1798, and the British sent out a force under Sir Ralph Abercromby to check their further progress in Egypt. After landing, Abercromby fought two actions and was advancing towards the city when, on the narrow strip of land between Lake Abukir and the sea, he was met by the French under Menou. In the early morning the French attacked in column, but only in one place did they break through the British line, and their cavalry were hardly more successful. Beaten back and troubled by fire from British gunboats, the French yet drew off in good order. Out of 15,000 engaged the British lost about 1,500; out of 20,000 the French lost perhaps 3,000. Abercromby was mortally wounded and Sir John Moore injured. The Gloucestershire Regiment and the Black Watch won especial honour. The fight led to the surrender of Alexandria five months later. See Abercromby, Sir Ralph.

Alexandrian Library. After the death of Alexander the Great and the partition of his empire, Athens ceased to be the literary centre of Greek culture. Its place was taken by Alexandria, the meeting place of East and West, under the enlightened rule of the first Ptolemies—Soter, Philadelphus, and Euergetes. Mainly by the efforts and financial assistance of Philadelphus, two collections of papyrus-rolls, consisting of literary treasures from all parts of the known world, were made, one housed in the Bruchcion quarter in the royal palace containing 490,000 rolls or volumes, the other, in the temple of Serapis, 42,000. Many of these were different copies of the same work: for instance, there are said to have been 500 MSS. of Aristotle.

At the time of the conquest of the city by Julius Caesar (47 B.C.) much of the Serapeum collection, then reckoned to contain about 700,000 volumes, was accidentally destroyed by fire, and in

the reign of Theodosius the Great the temple itself was sacked by a mob of fanatic Christians urged on by Bishop Theophilus (A.D. 391).

Connected with the Brucheon library was the Museum, a kind of academy, where a number of learned men, whose duty it was to see to the arrangement, cataloguing, and general improvement of the MSS., were housed at the royal expense. The first librarian was Zenodotus of Ephesus (280 B.C.), the Homeric scholar, and Callimachus (c. 300–240 B.C.), the critic, grammarian, and poet, compiled the first catalogue. These and succeeding librarians drew up for the benefit of students the Alexandrian canon—lists of authors considered the best representative models of different classes of literature.

Alexandrine Verse.

Rhymed iambic hexameter verses with the caesura properly between the sixth and seventh syllables. First used in the French metrical romance of Alexander the Great, from which, or from one of whose authors, Alexandre de Bernay, its name is probably derived, it became the standard form of French heroic verse. In this, acatalectic couplets with masculine, or single, rhymes alternate with hypercatalectic couplets with feminine, or double, rhymes. Drayton's Polyolbion is written entirely in alexandrines, and the final line of the Spenserian stanza is an alexandrine. The most generally familiar instance of the verse is furnished by Pope's disapproving description of it as a needless line "That like a wounded snake drags its slow length along."

Alexandrite. Name of a dark green variety of chrysoberyl. It is found in the Ural Mountains and is prized as a gem-stone on account of the light transmitted in a certain direction being red.

Alexandropol. Russian city in the Armenian S.S.R., now known as Leninakan (q.v.).

Alexandrovsk or PORT CATHERINE. Russian seaport in Kola Bay, now known as Katerina Harbour (q.v.).

Alexandrovsk. Town of Ukraine S.S.R., now known as Zaporozhe (q.v.).

Alexandrovsk-Grushevsk. A town of Russia in the Azov-Black

Sea area. It is on the Rostov-Zyverevo Rly., 16 m. N.N.E. of Novo-Cherkask. The district is one of the most important coal-fields of Russia. Pop. 20,000.

Alexei Mihailovitch (1629–76). Tsar of Russia. Son of Tsar Michael, the first of the Romanovs, whom he succeeded in 1645, he was at war with Poland, 1654–67, and with Sweden, 1656–61. Smolensk and Kiev, with the territory E. of the Dnieper, were added to Russia by the Polish war. Of his fifteen children, Peter the Great, the son of his second wife, was the youngest but one.

Alexei Petrovitch (1690–1718). Eldest son of Peter the Great. A student from boyhood, of weak will and pious inclinations, he was entirely out of sympathy with his father's plans and activities, and in turn was despised and hated by Peter. In 1717 he fled to the emperor Charles VI at Vienna, and Charles sent him for safety to Naples. Persuaded to return by a promise of pardon, he reached Moscow Jan. 31, 1718. The names of the accomplices in his flight having been extorted, he was knouted June 19 and 24, dying in prison at St. Petersburg, June 26, 1718.



Alexei, eldest son of Peter the Great, from an engraving after Dinglinger's painting. From Brückner, Peter der Gross

Alexeiev, MICHAEL VASSILIEVITCH (1857–1918). Russian soldier. The son of a private soldier, he fought in the Russo-Turkish war of 1877–8, then entered a military academy, gradually rising in rank by sheer merit. He was quartermaster-general in Manchuria during the Russo-Japanese war, 1904–5, and became chief of staff to the Russian 3rd Army after the battle of Mukden.

At the beginning of the First Great War, Alexeiev was chief of staff to General Ivanov, who then commanded the Russian armies of the south-west. When in 1915 the tsar became commander-in-chief, Alexeiev became chief of staff and the real generalissimo. After the revolution of March, 1917, he was chief of staff to Korensky; but when Lenin and Trotsky came to power in Nov., he retired to the Kuban and helped to organize the volunteer army to fight the Bolsheviks. On Sept. 25, 1918, he died of pneumonia at Ekaterinodar (now Krasnodar), in N. Caucasias.

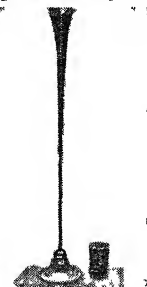
Alexius. Name of five East Roman emperors, 1081–1204, belonging to the Paphlagonian family of the Comneni. The only one of any importance was Alexius I. Another branch of the family supplied four emperors of Trebizond after the foundation of the Latin empire at Constantinople in 1204.

Alexius I Comnenus (1048–1118). East Roman emperor from 1081 to 1118. Elevated to the throne by a military revolution, he was confronted with serious dangers. In the west, the Normans landed in Epirus and besieged Dyrrachium. By valuable trading concessions Alexius secured the aid of Venice, and two naval victories put an end to Norman ambitions for a time. In the north, the marauding Petchenegs and the Turkish Kumans, who had crossed the Danube, were both defeated (1091 and 1094). In the east, the Seljuk Turks had founded a kingdom in Asia Minor.

Knowing the desire of Rome for a reconciliation with Constantinople, Alexius appealed to Pope Urban II for aid against the common enemy, Islam. The result was the first crusade and French victories over the Turks in Asia. Bohemund, leader of the Normans, set himself up at Antioch in 1098 as an independent ruler, and again attacked Epirus; but, overcome by Alexius's superior strategy, he was forced to sue for peace; and the defeat of the Seljuks in 1116 recovered the western half of Asia Minor for the empire. The end of Alexius's life was embittered by domestic quarrels as to the succession. A most capable ruler, by his military successes and skilful, if shifty, diplomacy, he postponed, but could not avert, the fall of the empire.

Aleyard or YARD of ALE. Old English drinking-glass, a yard or more long, holding about a pint.

It was usually trumpet-shaped, not unlike the horn carried by the guard of a coach. Sometimes it ended in a hollow ball; when the air reached the inside of the bulb the liquor spurted over the drinker. Drinking a yard of ale at one draught was a popular feat. The glass shown here is 38 ins. high and holds two pints.



Aleyard, British drinking-glass

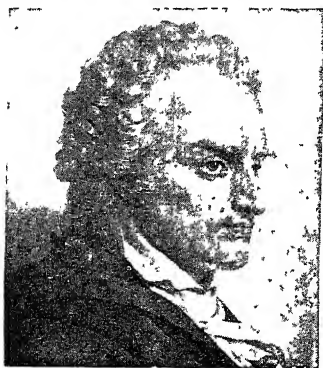
Alfa OR HALFA Arabic name for esparto grass (*q.v.*).

Alfadir. One of the many names for Odin, the father of the Norse gods. See *Odin*.

Alfalfa (Arab. *al-fasfasah*, good food). Spanish name for a leguminous fodder plant. See *Lucerne*.

Alfarabi (c. 900-950). Arabian philosopher of Turkish descent. Born at Farab (Otrar) in Transoxiana, he studied at Bagdad, travelled in Syria and Egypt, and finally settled in Damascus, where he died. He was the tutor of Avicenna. Alfarabi was the first Oriental scholar to comment upon the logic of Aristotle, for whom he had an enthusiastic admiration.

Alfieri, Count Vittorio (1749-1803) Italian poet. Born at Asti, Piedmont, Jan. 17 1749, at the



Vittorio Alfieri

age of fourteen Alfieri became practically his own master, with ample means, and as a youth showed little inclination for serious studies. He entered the army, and for some years led a life of dissipation and intrigue, varied with travel in France, Spain, Holland, and England. At the age of 26 he turned to literature and wrote a play on the subject of Cleopatra. The reception of this at Turin fired him with ambition to write Italian poetry, and he applied himself with zeal to the study of the Tuscan dialect and to supplying in other ways the deficiencies of his education.

Alfieri wrote six comedies, twenty-one tragedies, an opera, an epic, some lyrical poems, and an autobiography. In 1777 he met at Florence the countess of Albany, wife of Prince Charles Edward, the Young Pretender, at that time a confirmed drunkard. She left her husband some years later, and the pope granting her a separa-

tion in 1784, she lived happily with Alfieri until his death on Oct. 8, 1803, at Florence. He was buried at the church of Santa Croce, Florence. The success of Alfieri's work was mainly due to his style, which was something entirely novel to the Italians, who had been accustomed to an artificial and sickly form of drama. *Consult Lives* by C. M. Charles, 1856, and E. Copping, 1857, and Alfieri's Autobiography, trans. C. E. Lester, 1845.

Alföld. Name of two regions of Hungary. The Little Alföld lies N.W. of Budapest towards Bratislava in Slovakia, into which country it extends. The Great Alföld covers the area E. of the Danube to the Bihar mts. on the Transylvanian border and enters Rumania, at a mean elevation of 250 ft. above sea level.

Sometimes referred to as the puszta or steppe, the Alföld is a typical treeless grassland—though the acacia has been cultivated to bind shifting sand—with many sandy hillocks and lagoons. It was formerly devoted to horse-breeding, but the pressure of food requirements forced the Magyars to till large areas for wheat, so creating one of the granaries of Central Europe. Covered in summer with wheat, maize, barley, and rye, the plains may be snowed over in winter. The chief river is the Theiss (Tisza), which roughly bisects the Great Alföld.

The chief cities of Hungary, except Budapest, stand on the Great Alföld: Szeged, its commercial capital; Debreczin, known as the Calvinist's Rome, noted also for cattle and horses; and Kecskeket; also Arad, now in Rumania, and Subotica, now in Yugoslavia. Smaller places show characteristics of garden cities, built round open spaces where fairs and markets may be held. The district around Debreczin is known as the plain of Hortobagy, through which runs the river of that name. The biggest town on the Little Alföld is Győr (Raab). See *Hungary*.



Alfold. Herdsmen of the plain standing by their shelter; one wears a richly embroidered sheepskin cloak

Alfonsine Tables. Astronomical tables prepared by order of Alphonso X the Wise, king of Castile, in 1252. They were tables of planetary motions, based on the Ptolemaic system of astronomy.

Alfonso. Name of 13 Spanish kings, also spelt Alphonso (*q.v.*).

Alford. Village of Aberdeenshire, Scotland, on the Don, 30 m. N.W. of Aberdeen. Here on July 2, 1645, the Royalists under Montrose defeated the Covenanters under Baillie. Montrose selected a defensive position behind a bog and was able to render useless the enemy's superiority in cavalry. The proportion of losses on the Covenanters' side was enormous, while the most prominent Royalist killed was Lord Gordon. Perhaps 2,000 men were engaged on each side.

Alford, Henry (1810-71). A British divine. Son of the Rev. Henry Alford, vicar of Ampton, near Bury St. Edmunds, he was born in London, Oct. 10, 1810, and educated at Trinity College, Cambridge. He was ordained in 1833, became fellow of Trinity in 1834, and then



Henry Alford
in succession vicar of Wymeswold, Leicestershire, minister of Quebec Chapel, Marylebone, and, in 1857, dean of Canterbury. He died Jan. 7. 1871. Apart from his annotated Greek

Testament, 1849-61, Alfred is best known as the author of *The Queen's English*, 1864, and as the writer of several hymns. He was the first editor of the *Contemporary Review*. *Consult* Life, Journals, Letters, ed. by his widow, 1873.

Alfred. A masculine Christian name very popular in England, largely because it was borne by Alfred the Great. Of Anglo-Saxon origin, it means wise in counsel. The almost obsolete *Alurcd* is a variant.

Alfred the Great (849-901). English king. A younger son of Ethelwulf, the successor of Egbert, king of Wessex, Kent, and Essex, and overlord of the other English kingdoms, and his first wife Osburga, he was born at Wantage, in Berkshire, and in childhood was taken by his father to Rome. According to Alfred himself and Bishop Asser, his friend, contemporary, and biographer, he could not read until he was twelve. Alfred's three elder brothers all reigned in succession after Ethelwulf, the third, Ethelred, becoming king in 866.

For thirty years past Danish marauders had periodically flung themselves upon the E. and S. of England. In 866 they descended upon East Anglia, and in 867 made themselves masters of Northumbria. In 868 they attacked Mercia, but Ethelred and his young brother led an army to

the help of the Mercians. Neither Danes nor English could win a decisive victory, but the Danes agreed to accept an indemnity or ransom and retire from Mercia. In 871 they invaded Wessex in

Wedmore with stricter definition and guarantees under the compact known as Guthrum's Fryth. Guthrum's own authority, however, only extended over Essex and East Anglia. In 892 a Danish host under the Viking Hasting descended upon Wessex. But Alfred had mastered all the devices which had given the Danish hosts their ascendancy. He built ships like those of the Danes, only bigger; taught his men to fortify and hold entrenched positions, trained them to keep the field instead of dispersing as soon as they had inflicted a defeat upon the enemy. The Danes were so soundly beaten that from 896 until his death on (probably) Oct. 28, 901, Alfred was molested no more.

Alfred's genius as a military organizer, even more than his brilliant leadership, rescued half England from Danish conquest,



Alfred the Great. The hull in this representation of Noah's Ark from the Caedmon MS., is typical of the warships of Alfred's day

By permission of the British Academy

force, and were defeated at Ashdown, mainly by the skill and valour of Alfred; but two months later the Danes more than held their own in another great fight at Merton. A few days after the battle of Merton, Ethelred died, and Alfred succeeded.

Until 875 Alfred was left in peace. He used the time in organizing the English for war and in laying the foundations of a fleet, while the Danes consolidated their dominion over East Anglia, Northumbria, and the north of Mercia. In 876 they invaded Wessex once more, and at the beginning of 878 Alfred, with only a few followers, was driven into retreat in the isle of Athelney, in Somersetshire, an episode in his career to which belongs the story of the burnt cakes. Yet in May the English forces had been again so reorganized that Alfred was able to lead them to a great victory at Ethandune. This was decisive. The Danes had learnt to respect their foe's courage and resource, and their chief Guthrum agreed to the compact known as the treaty of Chippenham or Wedmore (May, 878), and, with several followers, received baptism. Another Danish irruption in 884 resulted again in victory for Alfred and the renewal of the treaty of

and prepared the way for the recovery of English supremacy from the Channel to the Tyne. He was no less great as an administrator. He codified the varying laws and customs of his kingdom, modifying and coordinating them into the code known as the dooms of King Alfred. His dooms may be regarded as the real foundation of the common law of England, though he created nothing that had any resemblance to trial by jury, popularly attributed to him. He imbued his people with a new sense of unity, a national instead of a merely local spirit.

Hardly less remarkable were his efforts and achievements in the direction of education, though he did not, as tradition asserts, found the university of Oxford. He organized the teaching of the young, summoning foreign scholars to his aid. He translated from Latin into Anglo-Saxon the standard works of his time on philosophy and history, such as the *Consolations of Philosophy*, by Boetius (*q.v.*), the *History of Orosius*, and the *Ecclesiastical History of Bede*. He instituted and placed in competent hands that continuous contemporary survey of events, still used as a basis by all students of Anglo-Saxon language and history.



Penny struck to capture of London



Alfred the Great. Statue by Hamo Thornycroft at Winchester, where the king died in 901

commonly known as the Anglo-Saxon Chronicle. With fervent religious faith he loved the right, and he did the right. His people adored him while he lived, when he died they adored his memory. No one has ever uttered a word of adverse criticism against him.

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Alfred Jewel. Enamelled gold oval jewel found near Athelney Abbey, Somersetshire, in 1693. Evincing indirect Byzantine influence, it bears a portrait presumably of the king surrounded by the words *Aelfred mec heht gewercean*, or Alfred had me wrought. It proves that skilled goldsmiths existed in Anglo-Saxon England.

Alfreton. Urban district and market town of Derbyshire, England. It is 14 m. from Derby, on the river, and the centre of a busy industrial district with potteries, stone quarries, collieries, ironworks, and hosiery manufacturing. The name is supposed to come from that of its founder Alfred the Great. Market day Fri. Pop. 21,232.

Alfriston. Village of Sussex, England, 7 m. NW. of Eastbourne across the South Downs. It is famous for a large 14th century church known as the

cathedral of the Downs (with a register dating from 1504), a rectory of the same period, secured by National Trust property, and a picturesque street containing the Star inn, one of the oldest in England with carved figures of saints. The Market Cross inn has associations with the lives of smugglers. The nearest railway station is at Berwick, about 3 m. to the N. of the village.

Alfuro. Term employed by the Malays for describing the uncultured non-Mahomedan peoples of Celebes, Ceram, and other islands in E. Malaysia. It is discarded by ethnologists because it represents no definite ethnic type. An Alfuro

—literally, outside—is usually of mixed Malay and negro blood, sometimes with a Caucasoid strain. Several dialects in Celebes and elsewhere are called Alfures.

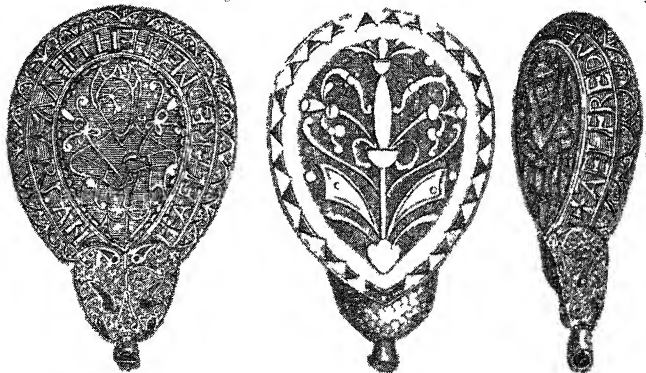
Algae (Lat. seaweeds). A large group of plants, simple in structure but ranging in size from a single cell to large strap-shaped seaweeds some sixty yards long. Throughout the group there is very little differentiation of cells for special functions, with the exception of the reproductive organs. Reproduction in individual plants may be sexual, i.e. by the union of male and female elements to form a new individual, or asexual, in which one or few celled packets are

liberated by the parent to grow into new plants.

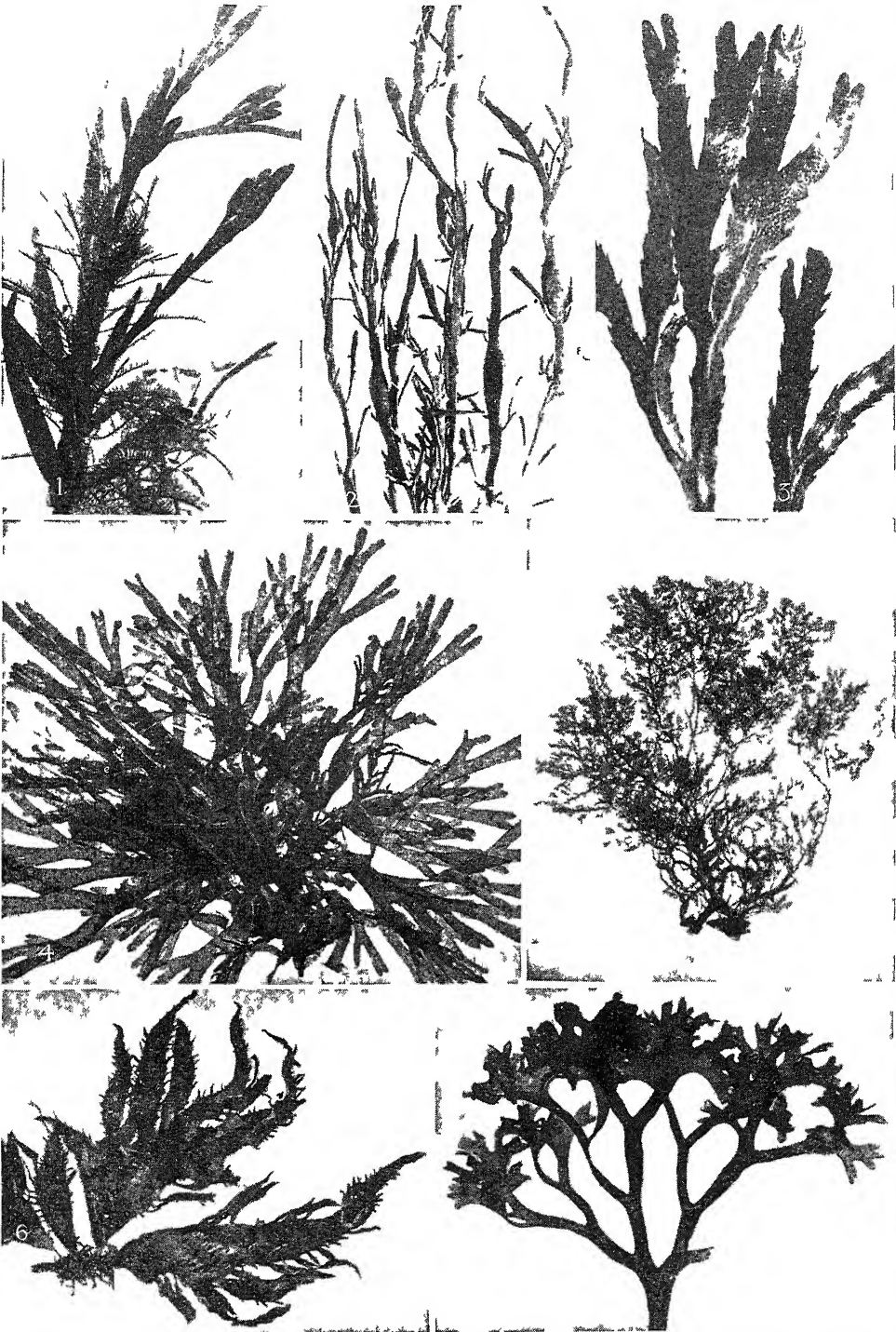
The algae form an unwieldy group, which is classified broadly speaking on the basis of colour. There are three main classes and some half dozen minor classes. The Rhodophyceae are the red forms, of which a few are found on British shores but most grow several fathoms below the surface of the sea. The Chlorophyceae are far more widespread, they are the grass-green algae, and are common in fresh water (the familiar blanket weed of stagnant ponds is an example) and also in salt water, e.g. sea lettuce. The green powdery 'dust' which grows on damp wood such as fences and tree trunks is a simple form which also belongs here. The Phaeophyceae, or brown seaweeds, comprise some of the largest species known. These all grow some distance out at sea, but smaller forms, such as the bladderwrack, are common on all parts of the British coast.

Before the Second Great War algae collected from the seashore and burned as kelp (q.v.) provided a potash fertiliser, some, such as Carrageen moss (*Chondrus crispus*) and laver (*Porphyra*), served as food. During the war a new industry developed in which calcium alginate was extracted from seaweed and used in surgical materials, textiles, and in paints and plastics. Two types of red algae (*Rhodophyceae*) provided a new source of agar-agar (q.v.) previously imported from Japan.

In geology, algae are fossil seaweeds, such as have largely helped in the building of certain lime stone rocks in Silurian, Devonian, Carboniferous, Jurassic, and Tertiary times, and of calcareous reefs around Pacific coral islands.



Alfred Jewel. Golden ornament found near Athelney Abbey Somerset, in 1693.
As in plate Museum Octo 1



1 Haldrys siliquosa with the finer growth of Polysiphonia or sea fir 2 Ascophyllum nodosum 3 Fucus serratus 4 Dictyota dichotoma 5 Plocamium coccineum 6 Gelidium latifolium 7 Chondrus crispus the carrageen or Irish moss which is used for making soup and also in the preparation of a kind of blancmange

ALGAE CHARACTERISTIC EXAMPLES OF VARIOUS KINDS OF SEAWEED

important to gravitational astronomy; the theory of invariants, which may be regarded as a study in algebraic form, and the theory of groups. Other "algebras" have been invented, with different fundamental laws (e.g. $xy = -yx$) logically deduced therefrom.

Algebra was invented by the later Greek mathematicians and developed by the Hindus and Arabs and in medieval Europe. There are many excellent textbooks; the most comprehensive work in English is *Treatise on Algebra*, G. Chrystal, 1886-9. See *Arithmetic*; *Calculus*; *Conic Sections*; *Equation*; *Mathematics*; *Trigonometry*.

Algeciras. Seaport and winter resort of S. Spain, in Cadiz province. It stands on the W. side of the bay of Algeciras, 6 m. W. of Gibraltar. The harbour is poor and used chiefly by fishermen. Oranges, charcoal, and leather are exported. Whale fisheries, operating off Algeciras, were started 1923 to 1925 with the help of Norwegian capital. The old town was founded by the Moors in 713; the modern town dates from the 18th century. In the bay, on July 6, 1801, Sir James Saumarez was defeated by a Franco-Spanish fleet, which, on July 12, he completely vanquished. Pop. 20,500.

Algeciras, CONVENTION OF. Agreement signed in 1906 regulating the affairs of Morocco. In 1904 Great Britain and Spain had agreed to allow France a free hand in Morocco. This Germany refused to recognize, contending that it was contrary to the Madrid convention of 1880, which gave equal rights to all the signatory powers. In March, 1905, the Kaiser visited Tangier, and the result of Germany's interference, then and later, was that the sultan of Morocco refused to agree to the reforms urged on him by France. He suggested a conference, which, after the resignation of Delcassé, France's foreign minister, met at Algeciras Jan. 16, 1906. Most of the European Powers and the U.S.A. were represented, Spain acting as host and president. Only Austria supported Germany, and on April 7 the convention, which admitted the privileged position of France, was signed. The reforms indicated were accepted by the sultan. These provided for the improvement of Morocco's administration, especially as regards finance and law and order, and regulated the trading rights of the various nations. See *Morocco*.

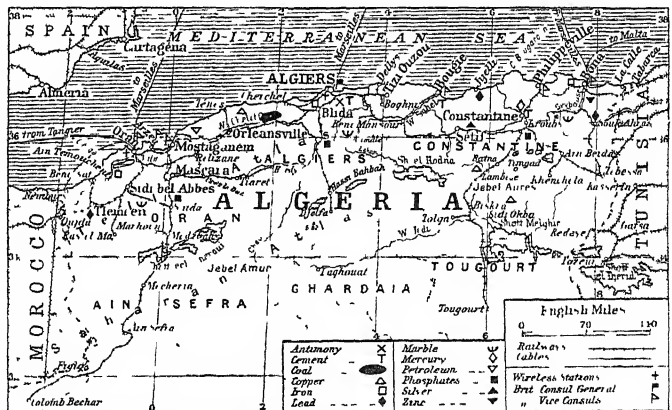
ALGERIA AND ITS CAPITAL ALGIERS

A description of the N. African territory that is now politically a part of Metropolitan France is followed by an account of its chief city, Algiers, giving its history from the 10th century to its day of political importance during the Second Great War

Algeria (Fr. *Algérie*) is not regarded as a colony, but is politically a portion of Metropolitan France, the Republic being represented by the governor-general in Algiers.

GEOGRAPHICAL FEATURES. Extending for 650 m. from E. to W., Algeria has an estimated area of 847,552 sq. m. Bounded on the W. by Morocco, on the E. by Tunisia, and indeterminately to the S. by the Sahara, Algeria is divided into two parts, Northern and Southern, the former consisting of three departments, Algiers, Oran and Constantine, and the latter of four territories, Ain Sefra, Ghardaïa,

the oases, such as Ghardaïa and Tougourt, in which French influence extends far to the south. North of the Tell, and on the border of the sea, are several separate groups of hills, such as the Sahel at Algiers. The Algerian rivers are short and are useless for navigation. They rise in the tablelands of the S. and cross the plain northward to the sea, forming winding, shallow watercourses, which in summer are little more than stony tracks. The Chelif or Shelif, 425 m. long, is the largest and most important. It rises in the N. declivity of the Jebel Amur, crosses the plateau in



Algeria, the land of the Mediterranean coast of Africa which was the last stronghold of piracy in European waters. It was, in 1830, taken over by France

Tuggurt or Tougourt, and the Saharan oases.

The Atlas Mts., running roughly parallel with the coast determine the configuration of the land. They consist of two series of chains, the Little, or Tell, Atlas to the N., and the Great, or Saharan, Atlas to the S., and form a broad belt of highlands, tablelands, and ravines. Their highest summit never attaining 8,000 ft., and separate the coastal region of undulating cultivated land known as the Tell from the desert region of the Algerian Sahara. This inland area sometimes called the high plateaux, includes the area of depression which contains the Shotts—saline, marshy, desolate tracts—and in the E. the area of the forested Jebel Aurès, which are high enough to be rainy and contain many very fertile valleys. The centres of population in the Saharan territories are at

a N.E. direction and turns W. to enter the Mediterranean through the Gulf of Arzeu. Next in size are the Seybouse, 145 m., and the Sahel, 100 m.

CLIMATE, FAUNA, AND FLORA. The climate is very hot in summer, but in spring is delightful, suggesting the fine, warm days of an English autumn or spring. There are occasional heavy rains, chiefly at night, but the rainfall is quickly absorbed by the porous ground, and the air is never damp. Algeria has therefore become a favourite residence for Europeans in the most congenial season.

Lions no longer exist, but leopards and panthers are occasionally met with, and jackals, hyaenas, wild boars, apes, antelope, red deer and wild goats are fairly common. Sheep, oxen, horses, mules, and camels are the chief domestic animals and among the

birds are eagles, hawks, vultures, ostriches, owls, and snipe.

The flora which comprises about 3,000 species is closely related to that of S. Europe. The trees of the forest-clad mountain districts include the cork oak, pine, cypress and cedar in the steppes grasses—principally alfa or esparto predominate, and in the Sahara the date palm is characteristic.

RESOURCES AND INDUSTRIES The country is rich in minerals. Of these, iron ore is the most important, being widely distributed and well worked. The output amounts to about two million metric tons annually. There is an important yield of antimony ore which is smelted at Pont de Vivaux, near Marseilles. Large quantities of phosphates are obtained at Constantine. The total output is not as great as that of Tunisia, but together these two French territories form one of the chief world sources of this important mineral. Small quantities of zinc ore are exported. There are cement factories near Algiers, Bougie, and Constantine. Good marbles and building stones are quarried.

Crops and Fruit

Agriculture, which provides employment for nearly three-fourths of the entire population, was greatly developed by the sinking of artesian wells, especially in the Sahara. About 8,000,000 acres are under cultivation for cereals, and produce chiefly wheat, barley, and oats. Alfa, or esparto grass, is gathered for export in very considerable quantities. Vegetables and fruit (oranges, figs, almonds, bananas, grapes, dates, etc.) are grown on an extensive scale, and tobacco is receiving increased attention with 57,899 acres under cultivation in 1938. Eucalyptus and acacia have been introduced with success. In the fertile coastal plains the vine has been much cultivated, and good wines are produced, which often, however, barely pay the grower. In 1937 the yield was over 339,000,000 gallons. The extraction of olive oil is a large industry, and experiments with cotton have been hopeful. The foreign commerce is principally with France.

There are over 3,000 m. of rivers, and 4,347 m. of national roads.

POPULATION The population is very mixed. Of the 7,234,684 inhabitants, the majority 6,247,432 are natives. The French number 853,209, and foreigners, 134,043. The French congregate chiefly in the towns, and, notwithstanding

great administrative efforts are not making Algeria a country of French people. The natives are Mahomedans, and consist of Arabs and Berbers. The Arabs are chiefly of nomadic habits, maintain the tribal form of society, make little or no advance in civilization, are very suspicious and have equal dislike and contempt for Western ideas and methods. They are indolent, courageous, and intensely religious.

The Berbers, of whom the Kabyles are the finest representatives, are very different in feature and in temperament from the Semitic nomads. They are of Hamitic origin, and doubtless include Greek, Latin, and northern blood infused during the vicissitudes of this long troubled country. The physical beauty of men and of women alike is often astonishing. Their complexion is fair to bronze and blue eyes and light hair are not uncommon. They are clever, industrious, quick to assimilate civilization, patriotic and devout.

GOVERNMENT Under the governor general there is a consultative council consisting of 15 members and a superior council consisting of 60 members. Three senators and ten deputies represent Algeria in the National Assembly in Paris. There is a prefect and council for each of the three departments of N. Algeria, consisting of French residents chosen by their fellows and natives nominated by the Minister of the Interior. In Algiers there is an excellent university, and there are Mahomedan colleges at Algiers, Tlemcen, and Constantine. The chief towns are Algiers, Oran, Constantine, Bona, Sidi bel Abbas, Tizi Ouzou, Philippeville, Mascara, Tlemcen, Mostaganem, and Bougie, all connected by railway.

Southern Algeria has been under a separate administration since Dec., 1902. Each territory is under a military command responsible to the governor general.

Military Service

French residents in Algeria before the Second Great War were liable for military service as in France. Natives had to serve 2 years and were then placed on the reserve. The military force of Algeria and Tunisia made up the 19th division of the French metropolitan army. There were 12 regiments of native tirailleurs and six regiments of Spahis, or Arab cavalry. There was also the Foreign Legion (*qv*) of four regiments, recruited from all nationalities, though mostly

officered by Frenchmen. At the time of the Allied landings in Algeria in Nov. 1942 the French military force there amounted to about 50,000 with five air force squadrons.

HISTORY Numerous evidences of the presence of man in prehistoric times abound, particularly cut flints, megalithic monuments, tumuli, and cromlechs. Near Kola is the tomb of Juba II, the Mauretanian king. The whole region is part of the Mauretania of the ancient Romans, whose sway after the destruction of Carthage, extended from the Red Sea to the Atlantic. The site of Carthage is near Tunis, where a Roman colony was powerful at the beginning of the Christian era. The Roman province of Africa increased in wealth, and presently the African Church became an important element in Christendom. In the 5th century Vandals from Spain swept through North Africa and they in turn, were driven forth by Belisarius. Put finally a Mahomedan invasion in the 7th century brought the whole of the region under the standard of the Crescent.

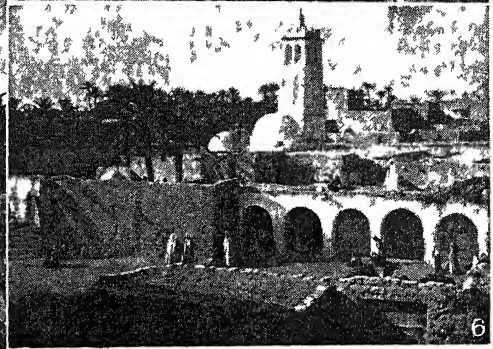
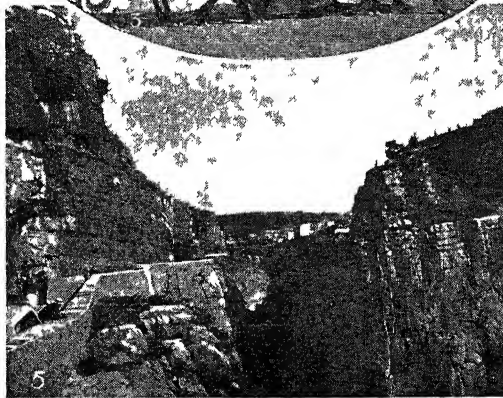
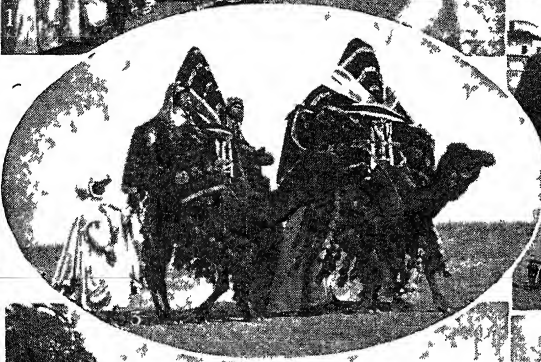
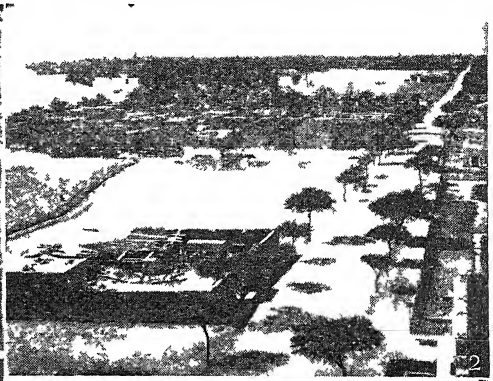
This was followed in the 11th century by a great immigration of Arabs, a lawless, nomad people, against whom certain coastal towns, of which Algiers was the chief, fortified themselves as independent powers. That city became the refuge of many Jews, driven from Europe in the 14th century, and later of many of the Moors expelled from Spain.

Modern Algeria

The long reign of piracy and lawlessness centred on Algiers led to the eventual annexation of the whole country by France. In 1830 a French army of 34,000 men seized and held the city and in Feb., 1842 Algeria became a part of France.

Throughout the rest of the 19th century insurrection gradually gave way to submission, and during the First Great War Algeria contributed largely to the fighting forces of Europe, not only from its European troops, but from the native tirailleurs and the Arab cavalry. Large numbers of German prisoners were transported from France and lodged in detention camps in and around Algiers.

After the capitulation of France to Germany in June 1940, Algeria came under the control of the Vichy government. Adm. Abrial, appointed governor general in Aug., 1940, was replaced by Gen. Weygand, the latter becoming



1 The street of the Ouled Naïl people from the Sahara Atlas, Biskra 2 Negro village of Biskra an Algerian winter resort in the Sahara 3 Ouled Naïl girls travelling on camel back 4 Government Square

Algiers with the mosque Jâma el Jedid 5 Gorge of the Rhummel at Constantine 6 Sidi Okba with its mosque the oldest in Algeria 7 General view of Algiers water front seen from the lighthouse jetty

ALGERIA IN CITIES AND DESERT PLACES OF A FASCINATING LAND



Algiers. Contrasts of new and old : left, road leading down from the Boulevard de la République to the quays ; right, street in the high-level native quarter known as the Kasba, so named from the old castle which dominates it

to Vichy, withdrew his opposition and appeared willing to cooperate with the Allies, he was nominated in Giraud's place on Dec. 1. Darlan set up an imperial council at Algiers which included Giraud and representatives of the Fighting French ; but his appointment aroused strong criticism not only among the Fighting French, but in Allied political circles. On Dec. 24 he was assassinated in the Summer Palace at Algiers, where he had his office, Giraud being chosen by the imperial council as his successor, while Gen. Juin became C-in-C. of all French forces in North Africa.

Extreme political confusion prevailed for a time. But at the end of May, 1943, Gen. de Gaulle, leader of the Fighting French, met Giraud in Algiers for a series of discussions with a view to establishing a central French authority ; and on June 3 the French Committee of National Liberation came into being. The formation of a new French cabinet was announced on the same date, with Giraud and de Gaulle as joint presidents. Algiers thus became the birthplace of the "fourth French republic." French nationality was restored to some 140,000 Algerian Jews who had been deprived of it under the Vichy regime. The provisional consultative assembly met for the first time in Algiers on Nov. 3, 1943, with its chief aim expressed as the

direction of France's war effort and the upholding of that country's rights until the day when the liberated French nation could freely express its will by universal suffrage.

On April 8, 1944, Giraud was appointed inspector-general of the French army in place of his former position of commander-in-chief ; but he declined the appointment and was placed on the reserve. During the spring and early summer of 1944 various fascist supporters and collaborators were tried by military tribunal at Algiers. See also France in the Second Great War.

Algin AND ALGINIC ACID. Algin is a gelatin-like substance, obtained from seaweeds. It is the sodium salt of alginic acid and forms in water exceedingly viscous solutions. Algin is used as a size for paper and textiles and in the ice-cream, cosmetics, and pharmaceutical industries. Alginic acid is used as a stabiliser in the explosives industry and as a thickener in dyeing. See *Algae*.

Algoa Bay. Wide roadstead on the E. extremity of the coast of

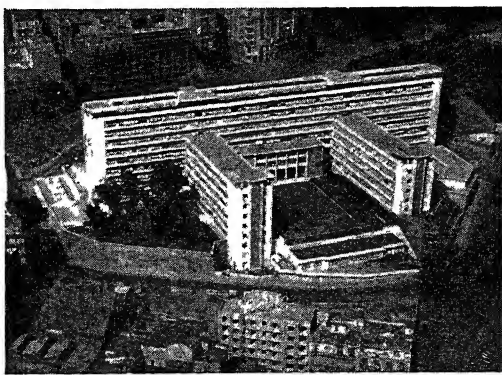
South Africa. Port Elizabeth lies in the S.W. angle of the bay, which provides fairly well sheltered anchorage.

Algol (Arab. *al-ghul*, the demon). Remarkable double star which is charted as β Persci. It was called by the ancient astronomers The Demon Star because of the malevolence of its winking eye, a phenomenon of varying brightness now ascribed to the revolution of a dark star about a bright one. Algol gives its name to a small class of variable stars, called Algol variables, the cause of whose waxing and waning brightness can be explained with certainty. The stars are partially eclipsed by the dark companion revolving round them. During the greater part of the time the light of Algol is of the magnitude 2.1, but every 2 d. 20 h. 49 m. the star drops down to magnitude 3.2, and then immediately begins to brighten again, the whole change occupying 9 h. 20 m. See *Astronomy* ; *Stars*.

Algoma. District in the S. of Ontario, Canada. Occupying an area of over 71,378 sq. m., it extends from Lake Nipissing in the E. to the Lake of the Woods in the W. It is a rich mining region, where iron, copper, silver, nickel, platinum, etc., are found, and is served by the C.P.R. The town of Algoma lies on the N. channel of Lake Huron.

Algonkian. Systematic name applied to those pre-Cambrian rocks of North America which are of sedimentary origin, such as sandstones. The name is used in direct contradistinction to the pre-Cambrian rocks of igneous nature, such as gneisses, which are designated Archaean.

Algonquin. Tribe of N. American Indians. They give their name—meaning at-the-fish-spearing—



Algiers. Government Building in the Boulevard Foch, H.Q. of the French Administration for North Africa

place—to the Algonquian linguistic family, which once extended across the continent S of the Eskimos, and may be related to the taller Magdalenian race. The Vikings encountered them about A D 1000. The family numbers about 55,000 in Canada and 40,000 in the U S A.

Algorism. Term employed to denote the Arabic or decimal system of numeration. The numbers of algorism are the Arabic or Indian numerals. The word is corrupted from the territorial name of the Arab mathematician, Abu Ja'far Mohammed Ben Musa Al Khwarizmi, the translation of whose work on algebra made known the Arabic numerals in Europe.

Algraphy. Term describing lithographic printing using aluminium plates instead of litho stones. With zinc plates the term zincography is used. See Lithography.

Alguazil (Span *alguacil*; Arab. *al uazir*, the vizier). Name of a Spanish official. It is bestowed on those who are concerned with the administration of justice, namely the bailiffs and attendants at the courts. An alguazil major is an official having authority over the ordinary alguazils.

Al-Hakim (d 976). Caliph of Cordova. Son of Abd er Rahman III, whom he succeeded in 961, he was an able administrator and a patron of learning. He founded the great library of Cordova and enlarged the famous mosque, subsequently a cathedral.

Alhambra (Arabic *al*, the, *hamra*, red). A famous Moresco Spanish palace. It stands on a spur of the hills on which Granada is built, and overlooks the river Darro. The building was begun by Mahomed I (1232-72), the ruler of the kingdom of Granada, and completed during the reign of Yûsuf I (1333-54), to whom are attributed the Gate of Justice, the Wine Gate, and several of the interiors. The palace stands in a park of English elms—a present from the duke of Wellington, who, in return for an estate bestowed upon him by Ferdinand VII, had these trees sent out from England.

The Alhambra is both a palace and a fortress. The outside walls are of great thickness and strength. Beyond these barriers, however, one enters a fairyland of the most delicate architecture imaginable. The main entrance is the Gate of Justice, beneath the arch of which the kings of Granada listened to the petitions of their subjects. Over the outer arch is carved an open hand, and over the inner a key, and a Moorish legend had it that the Christians would never take the fortress until the outer

hand had grasped the inner key. The halls, chambers, and smaller courts of the palace are grouped about two great courts: the Court of the Lions and the Court of the Fishpond. The Court of the Lions is approached through the Hall of Justice, famous for the beautiful arched entrance to its central divan and for its paintings on leather in the domes of the alcoves, representing deeds of Moslems and Christians. To the right of the Court of the Lions is the Hall of the Two Sisters, its façade consisting of a typically Moorish arcade carried on slender twin columns. The stalactite ceilings of the Hall are among the finest examples of their curious kind. Corridors and alcoves surround the Hall, and on the upper floor are retiring chambers, through the lattice windows of which the ladies of the harem were permitted to view the fêtes below.

Massacre of the Abencerrages

Facing the entrance, on the opposite side of the Court of the Lions, is the Hall of the Abencerrages. The fountain in the centre is surrounded by marble pavement, the peculiarly dark veining of which is said to be connected with a tragedy involving the massacre of thirty six knights of the Abencerrages by the otherwise amiable monarch Boabdil. The Court of the Lions, so called from the twelve marble lions grouped round the fountain in the centre, measures 100 ft by 50 ft, and the pavilions surrounding it consist of 128 columns, single and in pairs and groups. The Court of the Fishpond, or of the Myrtles, has a length of 150 ft, the whole being filled by a marble bath. The architecture of this court reaches a height of Eastern delicacy and beauty attained nowhere else in Spain. At the far end is the narrow Hall of the Barque, and beyond that the magnificent Hall of Ambassadors, a square of 37 ft, roofed with a dome the centre of which is 60 ft from the ground. This is the largest of the halls of the Alhambra, and is renowned for the variety and splendour of its decoration. Below the floor is a network of dark passages. A curious cell with whispering holes at each end is said to have been built by Philip II to amuse his unhappy heir, Don Carlos. To the left of the Fishpond is the Mosque, approached through the Court of the Mosque, and on the right are the Baths.

The outstanding features of the palace, the needle-like columns, richly carved capitals and decorated arches, gorgeous mosaics, and

the tracery, boundless in its variety, of wall, ceilings and windows, do not deviate from the characteristics of Mahomedan architecture. What is distinctive is the stupendous scale on which these details were carried out.

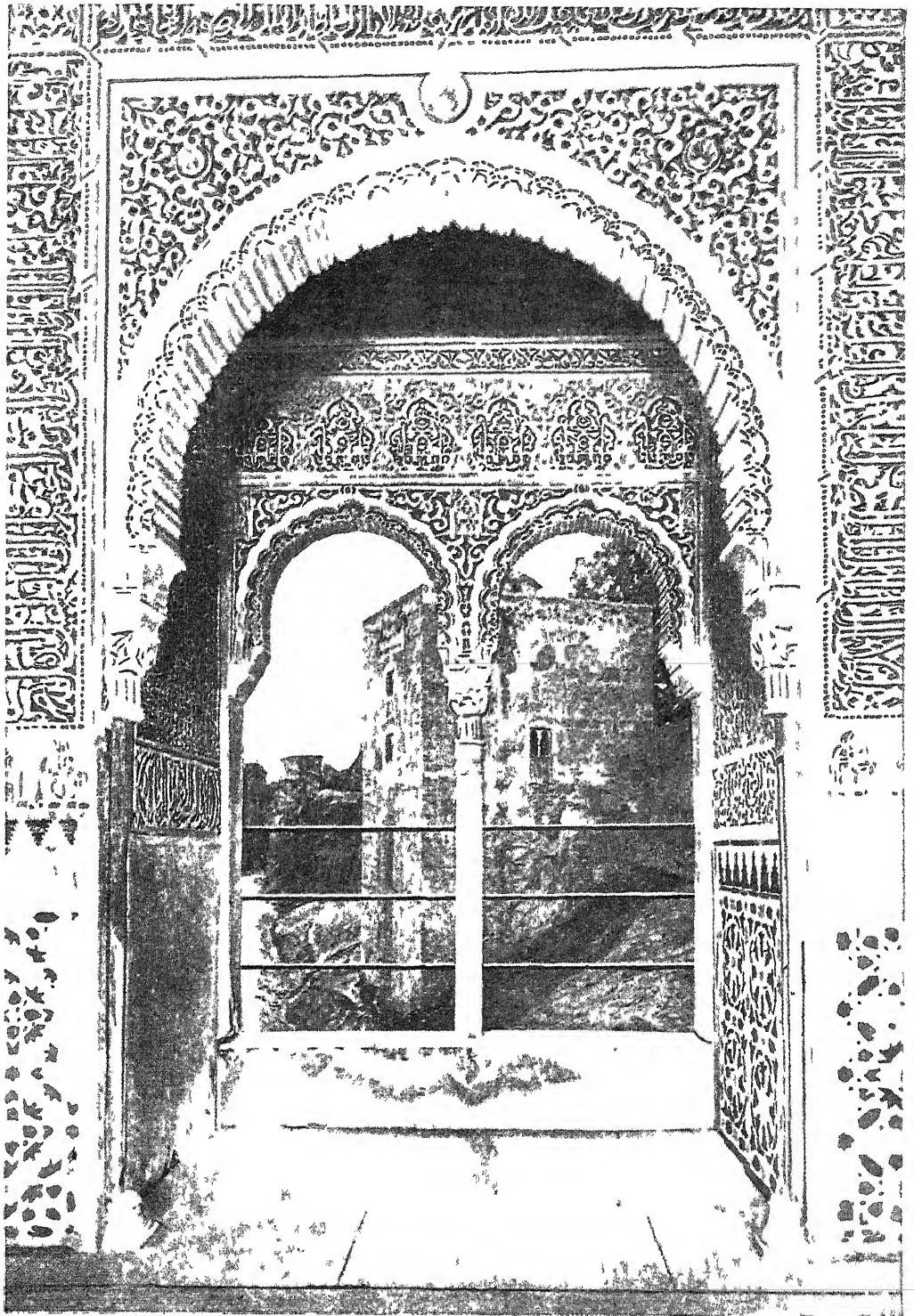
Of the outer fortifications, many old towers are partly ruins. In the Watch Tower there still hangs a silver tongued bell capable on a still night of being heard 20 m or 30 m away. It was here that, on the fall of the city, the Christian flag was first hoisted by Cardinal Mendoza and his brother.

Round the Alhambra there are grouped various subsidiary buildings. The most important of these is the palace of Charles V, begun in 1526, but abandoned in 1635. The Generalife palace, some little distance away, was a summer pleasurehouse of the Moorish kings.

Alhambra Theatre. Former London house of entertainment, built and decorated in imitation of the Moorish style of the Alhambra, Granada. Opened 1854, on the E side of Leicester Square, as the Panopticon of Science and Art, a popular rival to the Polytechnic, it became a music hall in 1857. The original building was destroyed by fire in 1882, but the theatre was rebuilt the next year. Variety, musical play, revue, and ballet were regularly staged there. Among notable successes: The Bing Boys Are Here (1916) ran for 378 performances, The Bing Boys on Broadway (1918) for 562. Johnny Jones (1920) for 348, Waltzes from Vienna (1931) for 607, Tulip Time (1935) for 427. In 1936 the Alhambra was demolished, the Odeon cinema being erected on the site.

Ali (c 600-661). Fourth caliph. Son of Abu Talib and cousin of Mahomet, whose daughter Fatima he married. He succeeded Othman as caliph in 656. He was vigorously opposed by Mahomet's widow Ayesha, whom he captured near Basra at the battle of the Camel, so called because Ayesha was mounted on a camel. He was assassinated at his capital Kufa, and his shrine at Nejed, known as Meshed Ali, became a famous place of pilgrimage. His followers form the Shiite sect of Mahomedans. He acquired a posthumous reputation for learning, and the Sayings of Ali and some lyric poems known as The Divan are attributed to him. The Fatimite dynasty claimed descent from Fatima and Ali.

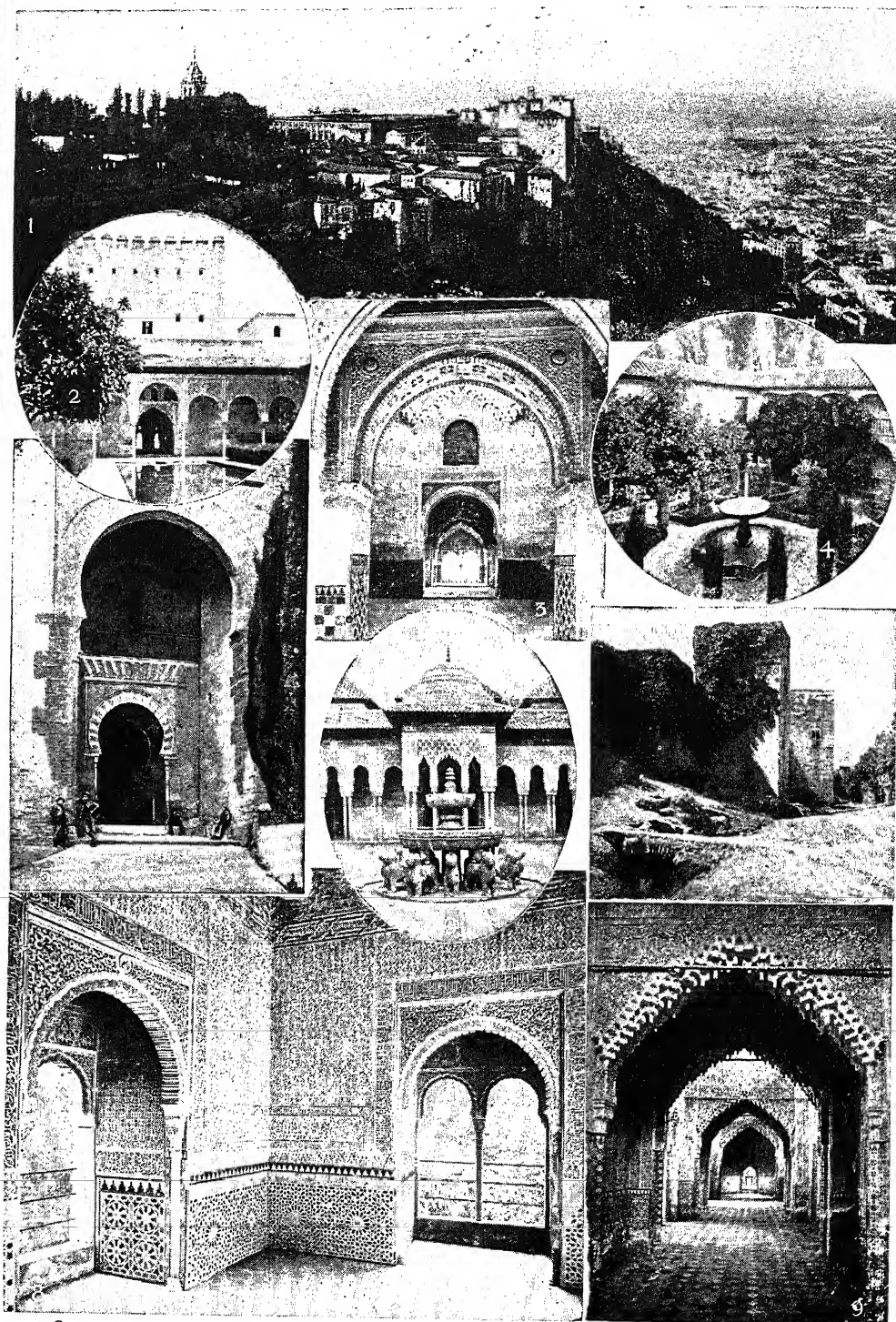
Alias. Latin word meaning otherwise. It is most generally employed for a name which is not the lawful one of the person using it. An alias may be quite legitimate,



This view of the Captive Tower from one of the windows of the Alhambra shows the richness of decoration which characterizes the Alhambra. The Captive Tower has been the prison of the Spanish monarchs Alphonse X and Sancho IV.

ALHAMBRA ORNATE PALACE OF THE MOORISH KINGS OF GRANADA

To face page 56.



1. General view of the Alhambra, with Granada on the right. 2. Court of the Myrtles and tower of the Hall of the Ambassadors. 3. Hall of the Two Sisters. 4. Garden of Lindaraja. 5. Gate of Justice. 6. Fountain in the Court of the Lions. 7. Tower of the Captive. 8. Rich decoration of an upper apartment. 9. Hall of Justice

ALHAMBRA: WITHOUT AND WITHIN THE WONDERFUL PALACE OF GRANADA

e.g. in the case of the pseudonym of a writer or actor. Its modern use is derived from a legal form formerly put down in indictments. To ensure the identity of a person charged with crime his indictment would run: Henry Jekyll alias Edward Hyde. *Pron.* Ai'-lee-ass.

Ali Baba. Hero of one of the tales in The Arabian Nights' Entertainments, that of Ali Baba and the Forty Thieves. Ali Baba is a poor man who happens upon the knowledge of a robbers' hoard and of the secret words, Open Sesame, which gain admittance to it. His brother Cassim finds out the secret and loses his life. The thieves seek to discover who has learnt their secret, and are successively killed in the attempt, thanks to the quick-wittedness and courage of Ali's slave Morgiana.

Ali Bey (1728-73). Mameluke sultan of Egypt. Born in Abkhasia, a region in the Caucasus, he became head of the Mamelukes (*q.v.*), and, taking advantage of the Porte's war with Russia, increased the number of the Mamelukes and reduced that of the janissaries. He assumed independent power about 1768 and, having subdued Syria and a large part of Arabia, was proclaimed sultan of Egypt by his cousin and nominee, the sheriff of Mecca. After a short reign he was defeated at Salahia by one of his sons-in-law who had revolted, and died of his wounds.

Alibi (Lat. *elsewhere*). A name given to a plea by an alleged criminal that he was somewhere else at the time. False alibis are very common, because nothing is more easy than for witnesses to be called to state that the prisoner was in their company at the time of the crime. They can give full details of everything that happened, and nothing is false but the date. Hence judges are very suspicious of this defence. The word is all too commonly used in the wrong sense, as a general synonym for "defence" or "excuse." *See* Evidence.

Alicante. Seaport and winter resort of Spain. Anciently known as Lucentum, it lies on the Mediterranean, is the capital of Alicante province, and has rly. communication with Madrid and Murcia. It enjoys an equable climate, has a modern cathedral and a good harbour, exports wine, fruit, esparto, and minerals, and manufactures cigars and textiles. Pop. 106,705.

Alicante. Maritime province of S.E. Spain. It is mountainous in N. and W., and is level and fertile elsewhere. Formed from parts of

the old provs. of Valencia and Murcia, it has an area of 2,185 sq. m. It has an equable climate, produces wine, sub-tropical fruits, and esparto grass, and the inhabitants engage in lead, iron, and copper mining. Pop. 630,770.

Alice. Town of Cape Province, S. Africa, on Tyumie river, 88 m. by rly. W.N.W. of East London. Near is the missionary station of Lovedale. Pop. 1,500.

Alice. Feminine Christian name. The word comes from the Anglo-Saxon *adel* or *ethel*, meaning noble. First it took the form of *Adelicia*, meaning noble cheer, then of *Alicia*, and later of *Alice*.

Alice (1843-78). Grand-duchess of Hesse-Darmstadt, and the second daughter of Queen Victoria. She was born at Buckingham Palace, April 25, 1843, and was named Alice Maud Mary. In 1862 she married Prince Louis of Hesse. She founded the Women's Union for Nursing the Sick and Wounded in War. She died Dec. 14, 1878, of diphtheria, caught in nursing her husband and children.

Alice's Adventures in Wonderland. A fantastic tale for children, written by Lewis Carroll (C. L. Dodgson). First published in 1865, it originated in a story which the author improvised for

What Alice Found There. These books, in their combination of lively extravaganza, parody and burlesque, and inverted logic, struck a new note in nursery fiction. The sequence of clearly defined, if extravagant, characters, *e.g.* the Mad Hatter, the Cheshire Cat, the Duchess, the White Knight, have made the books lasting favourites with both children and adults.

Alice Sit By The Fire. Satirical comedy by J. M. Barrie. It was first produced, April 5, 1905, at The Duke of York's Theatre, London, and ran for 115 performances.

Alice Springs. Seat of the administration of Northern Territory, Australia. It is situated 1,120 m. N.W. of Adelaide, on the transcontinental telegraph wire to Darwin, and is the terminus of the Central Australia railway from Adelaide. A road built during the Second Great War as a strategic link joins Alice Springs with Birdum, terminus of the North Australia railway (316 m. to Darwin). The town lies in a stock-rearing and mining country.

Alien (Lat. *alienus*, foreign). Person who does not belong to the country in which he lives, *i.e.* from the point of view of Great Britain, any person who is not a British subject. A person who is a



Alice at the Mad Hatter's tea-party, together with the March Hare and the Dormouse, a fine example of Sir John Tenniel's spirited illustrations to Lewis Carroll's famous story of *Alice's Adventures in Wonderland*

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some child friends, notably Alice Liddell, daughter of the dean of Christ Church, Oxford, and then wrote down for them. Illustrated by Sir John Tenniel, it enjoyed wide popularity, being followed in 1871 by a scarcely less attractive sequel, *Through the Looking-Glass* and

subject of a foreign state is not necessarily an alien here. Each state has its own laws as to who are its subjects and the laws of two states may overlap so that one person may have two nationalities. Thus, if a foreign woman married to a foreigner gives birth to a child

while staying, it may be for only a few weeks, in Great Britain. The child will certainly be born a British subject by English law (since all persons born in the British dominions are British subjects) and will also probably be a subject of the country to which his father belongs, by the law of that country. Thus in neither country is he born an "alien." When he becomes 21 he may make a declaration of allegiance giving up his British nationality.

Until 1870 aliens could not own freehold property in England, nor even leasehold property for more than 21 years, nor could they own any British ship. But by the Naturalisation Act, 1870, aliens were allowed to hold every kind of property except a British ship.

The main other disqualifications of an alien in peace time are that he is not qualified to serve on a jury (except, after 10 years' domicile, on an inquest); has no vote; cannot be a member of either house of Parliament; cannot hold any office of trust, or (apart from a temporary relaxation during the Second Great War) any office in the civil service. No alien can change his name (except, of course, in the case of a woman on marriage) without permission from the Home Secretary. If he is a director of a company, his nationality must appear on the company's notepaper. Even when he has been naturalised, his nationality of origin must appear.

The entry of aliens is controlled by the Home Secretary. No alien can enter except at certain approved ports and with the leave of an immigration officer. He must have a passport and satisfy certain conditions relating mainly to his character, health, and ability to support himself. When he has entered the country he must register with the police and keep them informed of any change of address.

During the Second Great War much more severe restrictions were imposed on aliens and particularly on enemy aliens—that is, subjects of any state at war with this country. Aliens, whatever their nationality, were forbidden to possess any firearms or ammunition, or even a bicycle, and had to observe a "curfew." Enemy aliens were for the most part interned. If not interned, their liberty might be severely restricted, e.g. they were generally prohibited from possessing a radio set.

An enemy alien could not sue in British courts, but might be sued, and, if sued, had a right to defend the proceedings. Enemy aliens residing in the United Kingdom with the permission of the Crown were, however, allowed to sue. British subjects who voluntarily resided in an enemy country were regarded as enemy aliens.

At Common Law trading with alien enemies is illegal, but during both the First and the Second Great Wars special Trading with the Enemy Acts were passed. The Act of 1939 made it illegal for anyone to have any "commercial, financial, or other intercourse or dealings with or for the benefit of the enemy." Custodians for enemy property appointed by the board of trade received any sums due to an enemy.

An alien may become a British subject by naturalisation or by being an inhabitant of territory ceded to the U.K. Under the British Nationality Act, 1948, an alien woman marrying a British subject, formerly automatically British, had to apply for naturalisation. See British Subject; Naturalisation.

Alienation. English legal term meaning the transfer of the ownership of property.

Alienism. Term in pathology meaning the study and treatment of mental disorder (*q.v.*).

Alif. First letter of the Arabic alphabet. Used as a symbol for Allah, the Mahomedan name for the Deity, it is often set at the head of Arabic documents.

Aligarh. District and fortified town of India. The district, the southernmost in the Meerut division of the United Provinces, has an area of 1,946 sq. m. The

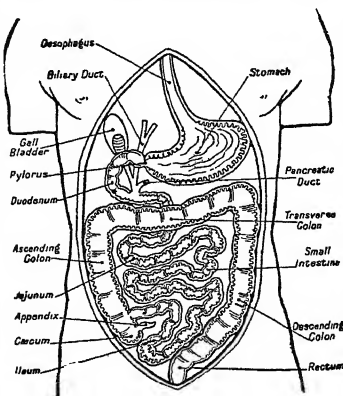
town, situated 55 m. N. of Agra on the E. Indian Rly., with the adjoining native city of Koil, forms for administrative purposes a single municipality. The fort, which gives its name to the place, was captured from the Mahrattas by Lord Lake in 1803. The former Aligarh College, founded by Sir Syed Ahmad in 1875, a famous Mahomedan centre of learning, was reconstituted in 1920 as the Muslim University. The town trades in cotton, grain, and indigo. Forty per cent of the population of the town are Mahomedans, although the district contains only 14 p.c. Pop. of town, 112,655.

Alignment or **ALINEMENT** (Fr. *à ligne*, to line; Lat. *ad*, to, *linea*, line). A technical term employed in drawing, engineering, military parlance, and surveying to indicate the laying out or adjusting of any units in a line, or the state of being in line. In drawing, a plan view may be referred to as the alignment of the subject; in engineering, units of machinery are said to be in alignment when the centres of the shafts or axles are in the same straight line; and in surveying the term is used in both these senses. In gunnery and musketry the term indicates the placing of the sights into such line with the target as will result in the latter being hit when the weapon is fired. See Artillery.

Alima. River of French Equatorial Africa. Rising near Ogowe Springs, it flows E. and S.E. to the Congo some 250 m. N. of Brazzaville. Discovered by De Brazza in 1878, its length is 400 m., about 200 m. being navigable.

Alimentary Canal (Lat. *alimentum*, food). Anatomical term for the channel leading from the mouth to the anus, along which the food passes in the process of digestion. It is composed of the oesophagus or gullet; the stomach; the small intestine, which is divided into the duodenum, about 9 ins. long, and the jejunum and ileum, together about 23 ft. long; the large intestine, about 6 ft. in length; and the rectum.

Alimony (Lat. *alere*, to nourish). Legal term used for an allowance in money paid by husband or wife, generally the former, to a spouse from whom he or she is separated. Where the marriage is dissolved, the guilty party may be ordered to pay a sum to the other for maintenance; but this is not alimony, though it is often called so. While divorce proceedings are



Alimentary canal in section, showing a few of the convolutions of the 23 ft. of the small intestine

pending, the court usually orders alimony to be paid by the husband to the wife, generally at the rate of one-fifth of the husband's income. After a decree of judicial separation, the court usually orders the husband to pay such a sum as will make up his wife's income to one-third of their joint income. Thus, the wife has £100 a year of her own; the husband has £500 a year. £100 + £500 = £600. The wife is entitled to one-third; so the husband is ordered to pay £100 a year to bring her income to this figure.

In Scots law the term *aliment* is used in this connexion, although not quite with the same meaning. *Aliment* refers to allowances made not only to husband or wife, but to children, grandchildren, parents, and even to grandparents. The maintenance of these, if their age and condition demand it, is a legal obligation, and if neglected can be enforced by legal action.

Aline. Sea-loch of Argyllshire, Scotland. Forming an arm of the Sound of Mull, it is 2½ m. long and ½ mile wide. Near are the ruins of Kinlochaline Castle.

Alington, CYRIL ARGENTINE (b. 1872). British divine, schoolmaster, and writer. The son of a Lincolnshire clergyman, he was educated at Marlborough and Trinity College, Oxford, and became a Fellow of All Souls in 1895. After holding masterships at Marlborough and Eton, he took holy orders and was appointed headmaster of Shrewsbury in 1908. In 1916 he succeeded Dr. Edward Lyttelton as headmaster of Eton, and in 1933 was appointed dean of Durham. His writings include detective fiction and volumes of popular religious exposition.

Ali Pasha (1741-1822). Albanian ruler, known as the Lion of Janina. An able and just ruler within his own dominions, Ali Pasha was unscrupulous and merciless in his dealings with enemies or doubtful allies. As a Turkish vassal, he was appointed pasha of Trikala in Thessaly for his services in the war of 1787, and in 1788 became pasha of Janina. During the Napoleonic wars he took the side of the French and the British alternately, with a view to securing a firm foothold on the Adriatic. This he appeared to have accomplished when Parga in Albania was granted to him by the British, but in 1822 he was defeated and put to death by order of the sultan, Mahmud II. Byron, who met him, refers to him in *Childe Harold*. He is the central figure in Maurus Jokai's novel, *The Lion of Janina*.

Alipore. Southern suburb of Calcutta, India. It contains public offices, Belvedere House, the residence of the lieutenant-governor of Bengal, a large gaol, and cantonments for native troops. Here are also the Zoological Gardens and the Horticultural Society's Gardens.

Alismaceae. Large family of flowering plants, more or less aquatic in habit. They are perennial herbs, with erect or floating leaves produced directly from the rootstock, which is often fleshy. The flower parts are in threes or multiples of three. The species, of which there are about 50, are of no economic importance; they are represented in most climates. Familiar genera are water plantain (*Alisma*), arrow-head (*Sagittaria*), and flowering rush (*Butomus*).

Alison, SIR ARCHIBALD, BART. (1792-1867). British historian. Eldest son of the Rev Archibald Alison (1757-1839), who was author of *Essays on the Nature and Principles of Taste*, he was born at Kenley, Shropshire. He studied at Edinburgh University, became an advocate, and in 1834 was made sheriff of Lanarkshire. In 1832-3 he published *Principles of the Criminal Law of Scotland*, long a standard work; in 1833-42 the *History of Europe from 1789 to 1815*, and in 1852-9 *Europe from Waterloo to the Accession of Louis Napoleon*. Alison was made a baronet in 1852, and died May 23, 1867.



Sir A. Alison,
British historian

Alison, SIR ARCHIBALD, BART. (1826-1907). British soldier. Eldest son of the historian, Sir Archibald Alison, he was born at Edinburgh. He entered the Seaforth Highlanders in 1846 and fought in the Crimean War and also the Indian Mutiny, losing his left arm at the siege of Lucknow. After holding commands at home, he served in the Ashanti War of 1873-4, led the Highland Brigade at Tel-el-Kebir, and, gazetted general 1888, succeeded Wolseley as commander-in-chief in Egypt. For five years he held the Aldershot command. He died Feb. 5, 1907.



Sir A. Alison,
British soldier

Aliwal. Village of E. Punjab, India. It is on the Sutlej, 9 m. W. of Ludhiana, and was the scene of a battle fought Jan. 28, 1846, between the British and the Sikhs. The latter had moved a big force to seize Ludhiana and so break the British communications with India. To check this Sir Hugh Gough, the British commander, detached Sir Harry Smith, who, with 12,000 men, freed Ludhiana and crushed the Sikh army at Aliwal, thus giving the territory E. of the Sutlej to the British.

Aliwal North. A town and district of Cape Province, S. Africa. The town, on the Orange river, 280 m. by rly. and about 170 m. direct N.N.W. of East London, was captured from the Boers on March 11, 1900. The Aliwal sulphur springs are near the town. The district, bounded N. by the Orange river and W. by the Stormberg Mts., has an area of 809 sq. m. Pop. district, 15,838; town, 7,647.

Aliwal South. Old name of the S. African port Mossel Bay (*q.v.*).

Alizarin (Arab. *al*, the; *asarah*, plant-juice). The chief colouring matter contained in madder, *Rubia tinctoria*, a dye used for the colour known as Turkey-red. Alizarin was first isolated from madder by Colin and Robiquet in 1826, and its chemical composition established by Schunck of Manchester.

Perkin, the discoverer of the first aniline dye, turned his attention to the artificial production of alizarin, and in 1868 prepared it commercially from anthracene. He succeeded and made England the birthplace of the manufacture of artificial alizarin. The manufacture is now successfully carried on by the British Alizarin Company, founded by the Turkey-red Dyers' Association. Most commercial alizarin is made from anthraquinone (*q.v.*). The fabrics to be dyed with alizarin are first mordanted, various mordants being employed. With an alum mordant, red and pink shades result; with iron, shades of black and purple; and with tin crystals, a bright yellowish orange.

Aljubarrota. Village of Portugal, in Leiria district, 63 m. N.N.E. of Lisbon, where on Aug. 14, 1385, King John of Portugal gained the independence of his country from Castile.

Alk. A fragrant gum-resin obtained from the terebinth tree (*Pistacia terebinthus*) by incising the bark.

Alkahest or ALCAHEST. Fifth or unknown element, sought as a universal solvent by the early

alchemists. The term was coined, possibly by Paracelsus, to imitate an Arabic word. *See* Alchemy.

Alkali. A native judge who acts under the warrant of the governor of Nigeria.

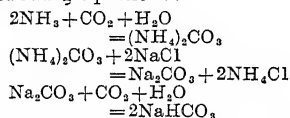
Alkali (Arab. *al*, the; *qali*, ashes of salt-wort). This rather vague word was used to denote the hydroxides of lithium, sodium, and potassium, the oxides of these three elements and of calcium, strontium, and barium, and also ammonium carbonate and the carbonates of lithium, sodium, and potassium. The most important of all these are sodium hydroxide (caustic soda), sodium carbonate (soda), and potassium carbonate (potash). Potash was in early days obtained from the ashes of burnt vegetable matter (land plants); soda was obtained partly from the ashes of seaweeds, kelp, and partly from natural deposits of trona, the sesquicarbonate, $\text{Na}_2\text{CO}_3 \cdot \text{NaHCO}_3 \cdot 2\text{H}_2\text{O}$, found in Egypt and in some other localities. In 1775 the French Royal Academy of Science offered a prize for the best method of obtaining sodium carbonate from common salt. The prize should have been awarded to Nicholas Leblanc, who in 1790 started the manufacture of soda at S. Denis by a process of his own invention, but it was not awarded and in 1792 Leblanc's patents and his works were confiscated by the French government. Leblanc was reduced to poverty and committed suicide in 1806. This process was introduced into England by Losh in 1796, and was developed on a

larger scale by Muspratt in 1823 and by other manufacturers here who made use of the various by-products formed in the process, until the alkali industry included the manufacture of many of the compounds of sodium and potassium that were of commercial importance.

The Leblanc process used common salt, NaCl , limestone, CaCO_3 , and coal (impure carbon) as its raw materials. The first step was to treat the salt with sulphuric acid so as to make sodium hydrogen sulphate and hydrochloric acid; the sodium hydrogen sulphate was heated with limestone and coal to make sodium carbonate and calcium sulphide; the hydrochloric acid was collected and used for making bleaching powder and other substances, and the calcium sulphide was originally thrown away, but in later years the sulphur in it was converted into sulphuric acid and used for a variety of chemical operations. The sodium carbonate was used as washing soda, and in the manufacture of glass and soap, and the industry attained great importance. The Leblanc process for making soda flourished on a very large scale in Great Britain for a period of about seventy years; it depended for its success partly on the recovery and use of the by-products made in the process, one of the most important being chlorine. Weldon in 1869 and 1870 effected a notable saving in this recovery; the price of bleaching powder was reduced by £6 a ton; its production was

quadrupled, and something like £750,000 per annum was added to the national wealth. The French chemist Dumas said that by Weldon's invention every sheet of paper and every yard of calico had been cheapened throughout the world. In spite of its success the Leblanc process was driven out of existence by a better one, the Solvay process.

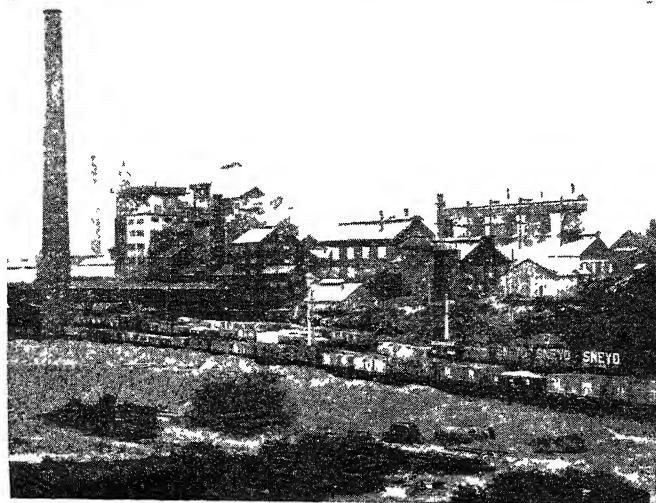
This process, known as the ammonia soda process, was started by Ernest Solvay and his brother in Belgium in 1865 and after a long struggle drove the Leblanc process out of existence. The Solvay process consists in saturating a solution of sodium chloride (brine) with ammonia and carbon dioxide in accordance with the following equations:—



The NaHCO_3 , sodium bicarbonate, so formed is heated to produce the normal carbonate, carbon dioxide, and steam, the action being as follows:—



In the year 1873 the Solvay firm granted to John Brunner and Ludwig Mond a licence to use this process in Great Britain, and the two started a works in Cheshire. Gradually, largely owing to Mond's determination and chemical knowledge, they overcame the considerable difficulties of the process and greatly improved it so that it became more economical than the Leblanc process. The raw materials of the Solvay process are lime, carbon dioxide, and ammonia. The carbon dioxide is obtained by heating limestone in kilns, and the quicklime so made is used in the process for the recovery of ammonia. A strong solution of brine is saturated with ammonia and the solution falls down a tower fitted with baffle plates and meets an ascending current of CO_2 ; the sodium bicarbonate, not being very soluble, crystallises out. The sodium bicarbonate is converted into the normal carbonate by heating it in open pans; the anhydrous sodium carbonate is called soda ash; if this is dissolved in water and allowed to crystallise, crystals of the decahydrate, $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$, are formed. This compound is called washing soda; from it the crystal carbonate, $\text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O}$ can be prepared by slow evaporation. Another sodium carbonate is known as concen-



Alkali. One of several great plants devoted to the production of alkalis and the numerous chemical processes connected with their use
Photo, courtesy of Imperial Chemical Industries

trated soda crystals; it has the formula $\text{Na}_2\text{CO}_3 \cdot \text{NaHCO}_3 \cdot 2\text{H}_2\text{O}$, and is prepared by crystallisation from a solution containing equimolecular quantities of the two carbonates.

sodium; the chlorine is drawn away and either liquefied or used for making hydrochloric acid, or bleaching powder, or some other compound of chlorine. The sodium dissolves in the mercury

The damage caused to vegetation in the neighbourhood of the works led to legislative action being taken to compel alkali makers to condense the acid gases.

The result was the first Alkali Act, 1863, which limited the amount of hydrochloric acid gas allowed to be evolved. Its scope was extended in 1874 to include other noxious gases. These Acts were further extended and consolidated in 1881. Another Act, in 1892, added to the list. The Alkali, etc., Works Regulation Act, 1906, consolidated previous Acts, but war-time powers to override in certain circumstances were given by the Defence Regulations, 1939.

Alkaline OR ALKALI ROCKS.

Class of igneous rocks containing a relatively high percentage of soda and potash and thus characterised by a special mineral composition. They contain such minerals as nepheline, melilite, hauyne, sodalite, analcite, leucite, soda-pyroxenes and soda-amphiboles, orthoclase and anorthoclase. They are often restricted in their occurrence to certain definite areas or petrographical provinces, *e.g.* to that portion of N. and S. America E. of the Rocky Mts. and of the Andes. Some of the most important alkaline rocks are the nepheline-syenites, phonolites, and leucite-basanites.

Alkaline Earths. Term given by the old chemists to certain earthy minerals which they found to be insoluble in water, resistant to heat up to very high temperatures, and generally similar in their properties to alkalis. These substances were carbonates, sulphates, or oxides of the metals beryllium, barium, calcium, magnesium, and strontium, none of which metals is ever found native, and were supposed to be elements until proved compounds by Davy.

Alkaloids. Class of nitrogenous organic compounds possessing basic properties. They are found in plants and animals, the vegetable alkaloids used in medicine being the more important. The names used for alkaloids are made to end in "ine," while glycosides, which also occur in plants but contain no nitrogen, have names that end in "in."

Alkaloids are extracted from plants by grinding the plants to fine powder, moistening with 95 p.c. of alcohol, sometimes acidified with hydrochloric acid or mixed with lime, allowing the mass to stand for several hours, and then packing in a conical glass vessel known as a percolator. Alcohol is

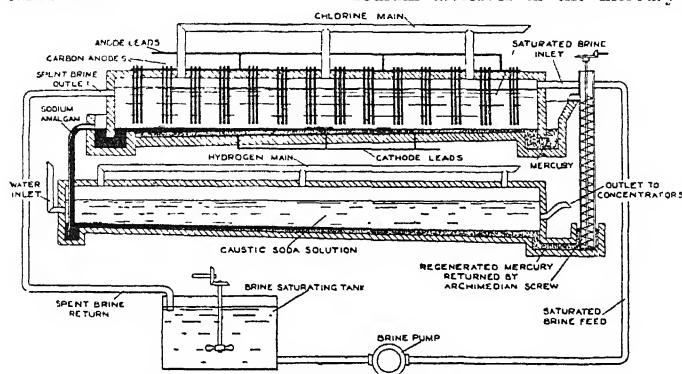


Fig. 7.—Electrolytic Decomposition of Brine.

Alkali. Apparatus used in the production of chlorine soda by the electrolytic decomposition of brine. See text

Sodium carbonate is used in large quantities for softening water, in the manufacture of glass, sodium silicate, borax, soap, and soap powders. It is also used in the textile industry and the paper industry. Caustic soda, NaOH , is largely used in the manufacture of artificial silk, the soap industry, the textile industry, oil refining, and the manufacture of coal-tar intermediates used in the dyestuffs industry. Sodium bicarbonate is a principal constituent of baking powder, Seidlitz powders, and other "health salts." Sodium sesquicarbonate is used on a considerable scale in wool washing.

Sodium carbonate is also used on a large scale as a flux to remove sulphur from pig iron; sometimes a mixture of one part of sodium carbonate, three parts of limestone, and one part of fluorspar is used for this purpose. A similar process is used for the removal of impurities from copper, brass, bronze, nickel silver, and aluminium-silicon alloys. Details will be found in British Chemical Industry by Morgan and Pratt.

Just as the Leblanc process was superseded by the Solvay process, so the latter is being in part superseded by electrolytic processes for making chlorine and caustic soda by the electrolysis of brine. One such process in use in England employs anodes of carbon and cathodes of mercury, the latter being a thin stream that flows from one cell to another. A current of about 120 volts D.C. splits up the sodium chloride into chlorine and

forming a mixture of mercury and sodium amalgam which, after passing through the proper number of cells, flows into a stream of water and is decomposed, forming again mercury and a solution of caustic soda and liberating hydrogen, which is collected and used to make hydrochloric acid. Another electrolytic process uses the Gibbs cell in which carbon rods form the anodes and perforated iron plates are the cathodes; this cell produces hydrogen, chlorine, and caustic soda solution at separate outlets. Electrolytic manufacture of caustic soda has been developed on a large scale in America where electricity is cheap.

Sodium carbonate, not quite pure, is found in a few dried-up lakes in Egypt, Armenia, and India. It is also found in considerable quantity at Lake Magadi, in British E. Africa, where it is worked by Imperial Chemical Industries Ltd. The solution is evaporated, and the first crystals deposited consist of the double salt $\text{Na}_2\text{CO}_3 \cdot \text{NaHCO}_3 \cdot 2\text{H}_2\text{O}$; from this salt the other sodium carbonates are easily prepared.

Alkali Acts. Laws for restraining manufacturers of alkali from polluting the atmosphere by the fumes from their works. When salt is decomposed by sulphuric acid in the manufacture of sodium sulphate, which is the first stage in the Leblanc process of making sodium carbonate, large volumes of hydrochloric acid vapours are given off. This was formerly allowed to go into the atmosphere, being accounted a waste product.

then poured over the contents of the percolator and the liquid allowed to filter slowly through. This liquid is collected and concentrated, ammonia is added, and the liquid shaken with ether or chloroform.

The alkaloids are dissolved by the ether or chloroform, and as these liquids separate they are removed to another vessel. The chloroform or ether being then evaporated, the impure alkaloid remains. This is a very general statement, as experience has shown better methods of extraction in particular instances. There are several reagents which give precipitates when added to liquids containing alkaloids. The chief alkaloidal reagents are—(1) solution of iodine in potassium iodide; (2) solution of the double iodide of mercury and potassium; and (3) solution of phospho-molybdic acid. These reagents can be employed for both qualitative and quantitative tests. Certain distinctive colours given by sulphuric acid and ferric chloride are also indications of the alkaloid present.

Many alkaloids exactly represent the active medicinal agent of the plant, but sometimes the activity of a drug is due to more than one alkaloid—e.g. opium, cinchona bark, and nux vomica. Several of the alkaloids are violent poisons, but in appropriate doses form valuable medicines. Most of them are solids, but a few, such as coniine, are liquids. Attempts have been made to classify alkaloids, but no final method has been adopted. The principal alkaloids obtained from the vegetable kingdom are the following:

Aconite (*Aconitum Napellus*, etc.).—Aconitine, lycaconitine, atisine.
 Areca nut (*Areca catechu*).—Arecoline, arecaine, guvaine, guvacoline.
 Barberry (*Berberis vulgaris*).—Berberine, oxyacanthine, berbamine.

Belladonna group (*Atropa belladonna*, *Hyoscyamus niger*, *Datura stramonium*, etc.).—Atropine, hyoscyamine, hyosine.

Broom (*Cytisus scoparius*).—Sparteine.

Calabar bean (*Physostigma venenosum*).—Eserine or phys stigmine, eseramine, physoverine.

Calumba (*Jatropha palmata*).—Jatrohizine, columbamine, palmatine.

Cevadilla (*Veratrum Sabadilla*).—Cevadine, cevadilline, veratridine, sabadine, sabidinine.

Cinchona (*Cinchona officinalis*, etc.).—Quinine, quinidine, quinamine, quinicine, quinoidine, cinchonidine, cinchonine, cinchonidine,

cinchonamine, cupreine, concusconine.

Coca (*Erythroxylon coca*).—Cocaine, cocamine, truxilline.

Ergot (*Claviceps purpurea*).—Ergotinine, ergotoxine.

Golden seal (*Hydrastis Canadensis*).—Hydrastine, berberine, canadine.

Hellebore (*Veratrum album*).—Jervine, veratralbine.

Hemlock (*Conium maculatum*).—Coniine.

Ipecacuanha (*Cephaelis Ipecacuanha*).—Emetine, cephaeline.

Jaborandi (*Pilocarpus microphyllus*).—Pilocarpine, pilocarpidine.

Laburnum (*Laburnum vulgare*).—Cytisine.

Lobelia (*Lobelia inflata*).—Lobeline.

Lupine (*Lupinus luteus*, etc.).—Lupinine, lupinidine, lupanine, arginine.

Meadow saffron (*Colchicum autumnale*).—Colchicine.

Nux vomica (*Strychnos nuxvomica*).—Strychnine, brucine.

Opium (*Papaver somniferum*) (in order of discovery).—Morphine (1816), codeine, thebaine, papaverine, meconidine, codamine, laudanine, laudanidine, laudanose, lanthopine, protopine, cryptopine, papaveramine, rhoeadine, narcotine, gnoscopine, oxynarcotine, narceine, pseudomorphine, tritopine, hydrocotarnine, xanthaline (1893).

Papaw (*Carica papaya*).—Carpaine.

Pepper (*Piper nigrum*).—Piperine, piperidine.

Pink root (*Spigelia Marilandica*).—Spigeline.

Pituri (*Duboisia Hopwoodii*).—Pituarine.

Pomegranate (*Punica granatum*).—Pelletierine.

Potato (*Solanum tuberosum*).—Solanine, solanidine.

Stavesacre (*Delphinium staphisagria*).—Delphinine, delphisine, delphinidine, staphisagrine.

Tea, coffee, and cocoa (*Camellia Thea*, *Coffea Arabica*, *Theobroma cacao*).—Caffeine or theine, theobromine, theophylline, xanthine, adenine.

Tobacco (*Nicotiana tabacum*).—Nicotine.

Yellow jasmin (*Gelsemium sempervirens*).—Gelsemine, gelseminine.

Yohimboa (*Tahermontana species*).—Yohimbine, yohimbenine.

Of late years a series of artificial alkaloids has been prepared and a few are largely produced in this manner. For detailed information on specific alkaloids reference should be made to Henry's Plant Alkaloids, 3rd edn., 1939; and Thorpe's Dictionary of Applied Chemistry, 4th edn., 1937-43.

A. Shepherd

Alkalosis. Term used in medicine to describe the conditions in which there is an increase

in the alkali reserve of the blood. It may be induced by giving excess of sodium bicarbonate or other alkali.

Alkanet. Name of certain plants of the family Boraginaceae, such as *Anchusa officinalis* and *Alkanna tinctoria*; also of a colouring material obtained from the root of the latter species, which plant is a native of S. Europe. It is an herbaceous perennial with oblong, bristly leaves, and bright blue funnel-shaped flowers.



Alkanet,
Anchusa officinalis

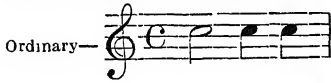
Al-Khwarizmi. Arabian philosopher and mathematician. He was born early in the 9th century, apparently at Khwarizm, the modern Khiva, hence his name. About A.D. 830 he wrote an algebra on which the subsequent Arabian and early medieval works on algebra were founded, and through which the Arabic system of decimal enumeration was introduced into the West. Some proofs in it are geometrical. He wrote on arithmetic and compiled two astronomical tables. His Arabic name was Abu Ja'far Mohammed Ben Musa.

Al-Kindi, Abu Yusuf. Arabian philosopher and mathematician. Born at Basra in the 9th century, he wrote on most of the existing sciences, especially mathematics and logic, and on Aristotle. He is revered by the Arabs as the philosopher. A few of his writings on astrology and medicine are extant.

Alkmaar. Town of N. Holland, prov. of the Netherlands. On the N. Holland Canal, 4 m. from the sea and 20 m. by rly. N.W. of Amsterdam, it is the chief market for cheese in Holland, manufactures sail-cloth and exports sea-salt. Its architectural features include the 15th century church of S. Laurence, called usually the Great Church and containing some old tombs. There is a town hall and a weigh-house dating from 1582. The town walls have been pulled down. The town withstood a siege by the duke of Alva, Aug. 21-Oct. 8, 1573. Pop. 31,774.

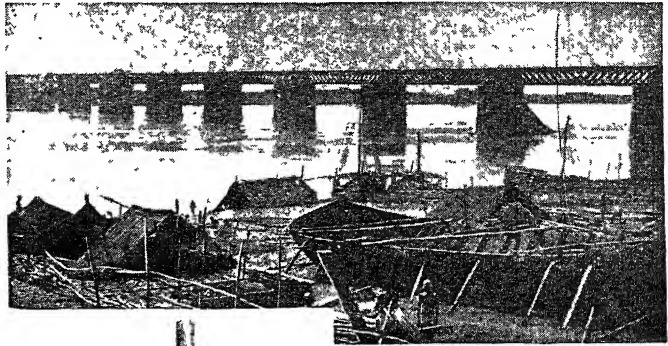
Alkyl. Name given to a series of hydrocarbons of which methyl, ethyl, butyl, and amyl are the best known. Alcohol is the alkyl hydroxyl derivative of ethyl.

Alla Breve (Ital., according to the breve). Music which has the breve for its standard of time and minims for the beats, instead of the semibreve as the standard with crotchets for the beats: e.g.

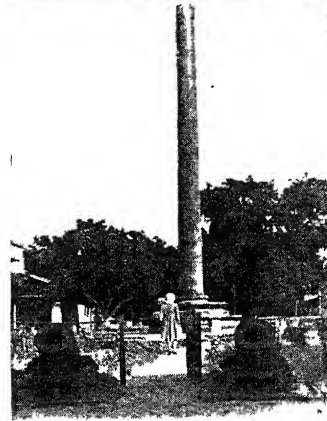


Allah (Arab. *al*, the; *ilāh*, God). Name adopted by Mahomet for the Most High God and used as such by Arab-speaking Jews and Christians, as well as by Mahomedans. The Moslem creed is expressed in the words: *lā ilāha illa'llāh, wa Muḥammad rasūlu'llāh*, signifying, There is no God but God and Mahomet is the prophet of God.

Allahabad. Division, district, and city of India. Allahabad city, the capital of the United Provinces, stands on the left bank of the Jumna, at its confluence with the Ganges, 565 m. N.N.W. of Calcutta, and is served by the Oudh and Rohilkhand, the Bengal and North-Western, and the E. Indian Railways, the first two with bridges



Allahabad. The East Indian Railway bridge across the Jumna



Allahabad, India. Modern street in the ancient city. Above, Asoka's pillar bearing an inscription, of a date between 300 and 200 B.C.

over the Ganges, the last-named with a bridge over the Jumna.

A holy place from a very early period, it was not until the construction of the fort by Akbar, in 1575, that the city, known to the Hindus as Prayāg, acquired political importance. In 1801 it was ceded to the English, and was the scene of a massacre during the Mutiny in 1857. Its industries include an iron foundry, indigo factories, and printing presses. It has a wireless station, and

among its principal buildings are the government house, the Mayo memorial hall, the Thornhill and Mayne memorial, with a public library and museum, the Anglican and the Roman Catholic cathedrals, the university, and the Muir college. The fort, beneath which the Saraswati is supposed to unite with the Ganges and Jumna, contains an underground temple (with a tree stump known as the undying banyan) and the Pillar of Asoka,

on which is inscribed an edict by that emperor (3rd century B.C.). Outside the fort are the mausoleum and gardens of Khusrū. The Jumma Musjid, or Great Mosque, was pulled down in 1157. An annual religious festival, the Magh Mela, is held on the sand below the fort in Dec.-Jan., when pilgrims assemble to bathe at the junction of the rivers. The district has an area of 2,858 sq. m. and produces grain, cotton, oil-seeds, sugar, and ghi. Pop. of city 260,630.

Allahabad, UNIVERSITY OF. Institution set up in 1887 as an examining and inspecting authority over higher education in the United Provinces of Agra and Oudh. In 1921 it was reorganized as a unitary teaching and residential university, but retained control over many affiliated colleges. These were transferred in July, 1927, to the new university at Agra. Degrees are awarded in arts, science, law, and commerce. In 1941 there were over 2,800 students, more than 500 being graduates.

Allamanda. Genus of S. American climbing shrubs of the family Apocynaceae. They have evergreen leaves and golden-yellow flowers, except *Allamanda violacea*, which has reddish-violet flowers.

An infusion of the leaves of *A. cathartica* in moderate doses is a valuable medicine in painter's colic, though in stronger doses it is violently emetic and purgative. The name comes from the Swiss scientist Allamand (1713-87).



Allamanda, American climbing shrub

Allan, DAVID (1744-96). Scottish painter. Born at Alloa, he went to Italy at the age of twenty to pursue his studies, painting in the style of Poussin. He returned to Britain in 1777, and after supporting himself by portrait painting in London, settled in Edinburgh, where he was made master of the Academy in 1786. He is sometimes referred to as the Hogarth of Scotland. Allan's self-portrait is in the Scottish National Gallery.

Allan, SIR HUGH (1810-82). Canadian shipowner. Born at Saltcoats, Ayrshire, Sept. 29, 1810, Allan went in early life to Canada, where he became partner in a shipping firm. About 1852 he founded the Allan line of steamers and was one of the promoters of the C.P.R. His donation to the party funds in Canada in 1873 was denounced as corruption and largely brought about the Conservative defeat at the ensuing general election. Knighted in 1871, he died in Edinburgh, Dec. 9, 1882. His son, Sir H. M. Allan (b. 1860), was knighted in 1904.

Allan, MAUD (b. 1879). British dancer. Born at Toronto of English parents, and educated at San Francisco, she studied music at Berlin and classical art in Italy. Fired with the desire to revive the classic dance, she first appeared as a professional dancer in Vienna in 1901, and later achieved success as a dancer in London and in the U.S.A. She is remembered for her performance of Salome in 1908. Returning to England in 1928, she devoted herself to teaching very poor children and later to preparing material for a work on her life.

Allan, SIR WILLIAM (1782-1850). Scottish painter. Born in Edinburgh, he was apprenticed to a coach-painter, and later studied at the R.A. schools in London. After residing in Russia, 1805-14, he returned to Edinburgh and took to

genre and history painting, finding subjects in The Waverley Novels. His Regent Moray Shot by Hamilton secured his election as A.R.A., and in 1834 he became R.A. Four years later he was elected president of the Royal Scottish Academy, and in 1841 succeeded Sir David Wilkie as limner to the queen in Scotland, an office which carried a knighthood. In 1843 he exhibited his Waterloo, which was purchased by the duke of Wellington. In 1844 he again went to Russia to obtain materials for his picture of Peter the Great Teaching his Subjects Shipbuilding. While engaged on a picture of the battle of Bannockburn, he died in his studio in Edinburgh, Feb. 23, 1850.

Allan, SIR WILLIAM (1837-1903). British politician and engineer. Born at Dundee, Nov. 29, 1837, he served in the navy as an engineer. In 1866 he settled in Sunderland, where he built up a big engineering business. He was one of the first employers to establish an eight hours working day. From 1893 until his death Allan was Liberal M.P. for Gateshead. Knighted in 1902, he died Dec. 28, 1903. He wrote much Scottish verse.

Allan Line. Former British steamship company. Established in Montreal by Sir Hugh Allan about 1852 as the Montreal Ocean Steamship Company, it was the first to adopt steel in the construction of its vessels, the turbine as a method of propulsion, and twin screws and bilge keels for checking oscillation. In 1917 the control was taken over by the Canadian Pacific Ocean Services, Ltd. (later Canadian Pacific Steamships, Ltd.).

Allantois (Gr. *allas*, sausage). Term denoting an anatomical structure found in mammals, birds, and reptiles. Its function is to secure the oxygenation for the embryo of these groups.

Alle. River of Poland and Russia, formerly of E. Prussia. It is a tributary of the Pregel, into which it falls 30 m. above Kalinigrad, and is about 125 m. long.

Allegation (Lat. *allegare*, to bring forward). English legal term. It means a statement as

yet unproved, but which those responsible for it believe to be true. Thus a phrase such as an alleged criminal is often applied to a person accused of crime before the charge has been substantiated in a court of law. In civil actions the facts necessary to establish the claim or defence are set out in allegations in the pleadings. Every allegation not specifically or impliedly denied or stated to be "not admitted" in the pleading of the other party is with some few exceptions taken to be admitted. See Libel.

Allegheny OR ALLEGHANY. River of U.S.A. Rising in the N. part of Pennsylvania, it passes into New York and curves again into Pennsylvania, where it follows a S.W. and S. course to Pittsburgh and unites with the Monongahela to form the Ohio. Its length is



Sir William Allan, British engineer

about 300 m., and it is navigable by small vessels for nearly 200 m. **Allegheny.** Industrial suburb of Pittsburgh, U.S.A. Formerly a city of Pennsylvania, it stands on the right bank of the Ohio river. It has several important educational institutions, a public library, observatory, and state penitentiary. An important rly. centre, on the Baltimore and Ohio and other rlys., it engages in the manufacture of pickles and preserves, and has rolling mills, foundries, breweries, etc. It gives its name to a county with a pop. of 1,411,539.

Allegheny Mountains. Name sometimes applied to the Appalachian Mts., U.S.A., but more correctly to a W. division of that system. This comprises a series of parallel and uniform ridges forming the watershed of rivers flowing to the Gulf of Mexico and Atlantic Ocean. Their forests yield much timber, and their output of iron, coal, and brimstone is valuable. Their mean elevation is about 2,500 ft. See Appalachians.

Allegiance (Lat. *ad*, to, *ligere*, to bind). Tie of obedience which binds a subject to the sovereign. A born subject of the Crown is said to owe *natural* allegiance to the King, and his Majesty is called his "natural liege lord." A person cannot be guilty of treason unless he owes allegiance to the Crown, for treason is essen-



Maud Allan, British dancer, remembered chiefly for her representation of Salome



Sir William Allan, Scottish painter

tially the violation of that allegiance. It would thus be impossible to charge with treason enemy subjects who secretly entered the country and committed offences against the state. It was partly in order to deal with such cases that the Treachery Act, 1940, was passed. See Sovereignty.

Allegory (Greek *allos*, other; *agoreuein*, to speak). Presentation or description of one thing under the image of another. It is a figure most frequently employed in literary composition, but also used in painting, as by Holman Hunt in *The Light of the World*, G. F. Watts in *Hope*, and Burne-Jones in *Love Leading the Pilgrim*, and less frequently in sculpture.

In literature allegory is a persistent form, owing to its convenience in permitting the presentation of abstract ideas in concrete forms. Plato's account of the cave in Book VIII of *The Republic* is a well-known instance of allegory in classical literature. Christ's parables are mostly allegorical, though the term is chiefly employed of the more sustained use of the figure. Early English literature is rich in allegory; Langland's *Vision of Piers Plowman* and Chaucer's *Romaunt of the Rose* being examples. It was one of the principal agents in the miracle plays and moralities which preluded the rise of the drama—Everyman is a notable example—and it merged in the drama itself, in the stamping of characters with names showing them to be personifications of different human qualities.

Allegretto. Musical term, meaning rather cheerful or lively. It is a diminutive of Italian *allegro*.

Allegro. Italian musical term meaning quick and lively.

Allemande (Fr. for German). Musical term used in several distinct senses. (1) Movement in the suites of Bach, Handel, and others, founded on the dance, treated in a solid, contrapuntal style. (2) A slow, graceful dance of German origin, popular under Napoleon I, was called the allemande. Ben Jonson, in *The Devil is an Ass*, mentions a dance called almain.

Allen. Lough or lake of Connacht prov., Eire. About 5 m. long by 3 m. broad, with an area of 8,900 acres, it is on the upper course of the river Shannon, in counties Leitrim and Roscommon.

Allen, Bog of. A tract of bogland in the province of Leinster, Eire. It extends into the counties of Kildare, Offaly, Laoighis,

and Westmeath, and its area is about 240,000 acres. It is not quite a continuous bog, strips of arable being found here and there. The peat goes down on the average for about 25 ft., and its nature varies from surface moss to lignite, while oak stumps and pine trunks are also found.

Allen, REGINALD CLIFFORD, 1ST BARON ALLEN OF HURTWOOD (1889–1939). English politician. Born at Newport, Mon., May 9,



Clifford Allen,
1st Baron Allen
of Hurtwood

1889, he became a leader of the Fabian group at Cambridge University. From 1911 to 1915 he was manager of the first Labour daily newspaper, *The Daily Citizen*. During the First Great War he was a prominent pacifist and three times went to prison as a conscientious objector. He was chairman of the Independent Labour Party 1922–1926. When the National Government was formed in 1931, he followed Ramsay MacDonald as one of the small National Labour group, and in 1932 was raised to the peerage. In later years his political outlook was that of a moderate without party affiliation. He died at Montana-Vermala, Switzerland, on March 3, 1939.

Allen, CHARLES GRANT BLAIR-FINDIE (1848–99). British author, better known as Grant Allen. Born at Kingston, Canada, he was educated at

King Edward's School, Birmingham, and Merton College, Oxford, and was professor and principal at Spanish Town, Jamaica, 1873–7. Allen was both a popular scientist and a popular novelist. His scientific attainments were considerable, and he was a luminous and entertaining writer on evolution and on biological and botanical subjects. His many novels include *The Woman Who Did*, 1895, which provoked much discussion. He died in London, Oct. 25, 1899. Consult Life, E. Clodd, 1900.

Allen, ETHAN (1737–89). American soldier. Born at Litchfield, Connecticut, he settled in Vermont and became a prom-

inent figure in the politics of that state, then in conflict with New York. In the Revolution he led a band of men against Fort Ticonderoga, which the British surrendered to him, and he served afterwards in an expedition against Canada. In 1775, near Montreal, he was taken prisoner and sent to England. After his return to Vermont he was accused of treason, on the ground of some correspondence with Sir Frederick Haldimand, the governor of Canada. He died Feb. 11, 1789.

Allen, GEORGE (1831–1907). English publisher. His association with John Ruskin is one of the romances of publishing. A skilled engraver and draughtsman, he came into touch with Ruskin while attending the Working Men's College, Great Ormond Street, London, and in 1871 was induced by him to become "the Master's" publisher, operating from his rural home at Orpington, "in the middle of a country field in Kent," as Ruskin put it. In time Allen's name became famous among London publishers, but after his death in 1907 his business declined. His name is still honoured in the publishing firm of George Allen & Unwin, of which Stanley Unwin became head.

Allen, SIR HARRY BROOKES (1854–1926). Australian physician. Born at Geelong, June 13, 1854, he graduated in medicine at Melbourne University, where he was appointed demonstrator in 1876. He was made professor of pathology in 1882, later dean of the school, and was knighted in 1914. He created the museum of pathology at Melbourne, wrote books on cancer, tuberculosis, etc., edited *The Australian Medical Journal*, and obtained recognition in Europe for the medical degrees of Melbourne University. He died March 28, 1926.

Allen, HERVEY (b. 1889). U.S. writer. Born at Pittsburgh, Pennsylvania, on Dec. 8, 1889, he became a graduate of Harvard, Litt.D. and F.R.S.A. He served in the U.S. navy and joined the U.S. army during the First Great War. After publishing several volumes of poetry and a notable biography of Poe (1926), he achieved immense success with his long historical novel, *Anthony Adverse*, 1933. This was followed by *Action in Aquila*, 1938, and a trilogy of novels under the general title of *The Disinherited*, of which the first book, *The Forest and the Fort*, was published 1943, the second, *Bedford Village*, 1944.



Grant Allen.
London Stereoscopic Co

Allen, Sir Hugh Percy (1869–1946). British musician. He was born at Reading, Dec. 23, 1869, and educated at Kendrick School, Reading, and Christ's College, Cambridge. At the age of eleven he was appointed organist of St. Saviour's, Reading. He subsequently held many similar appointments, and became closely associated with the music of both Oxford and Cambridge and developed the musical life of the universities. He was director of the Royal College of Music, 1919–37, was appointed professor of music at Oxford, 1918, and became president of the Royal College of Organists. He was conductor of the London Bach Choir and the Oxford Bach Choir. He was knighted in 1920, created K.C.V.O. in 1928, and G.C.V.O., 1935. He died Feb. 20, 1946.



Sir Hugh Allen,
British musician

Allen, Sir James (1855–1942). New Zealand politician. Born in S. Australia, and educated at



Sir James Allen,
N.Z. politician

Clifton and St. John's College, Cambridge, he became a mining engineer. Settling in New Zealand, he entered the legislature in 1887, and in 1912 was made minister of finance, education, and defence. He had much to do with sending New Zealand troops to the First Great War, and in 1917 was made a K.C.B. In 1919 he was made minister for external affairs. He was High Commissioner for New Zealand, 1920–26, and a member of the legislative council from 1927 to his death, July 28, 1942.

Allen, James Lane (1849–1925). American novelist. Born at Lexington, Kentucky, and educated at Transylvania University, for some years he was a schoolmaster, then a teacher at Kentucky University, afterwards acting as professor of Latin

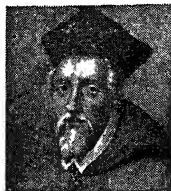


James Lane Allen,
American novelist

at Bethany College, West Virginia. His novels, poetically conceived and delicately written transcripts of life in his native state, include *A Kentucky Cardinal*, 1895; *The Choir Invisible*, 1897; and *A Cathedral Singer*, 1916. He died Feb. 18, 1925.

Allen, Ralph (1694–1774). English postal reformer. On becoming deputy postmaster at Bath, he devised a system of cross-posts in England and Wales, which from 1720 to his death yielded him a profit of £500,000. His wealth, increased by the successful working of stone quarries near Bath, was lavishly expended, and Allen became known as *The Man of Bath*. Fielding has drawn him as *Squire Allworthy* in *Tom Jones*.

Allen, William (1532–94). English cardinal. Born of Roman Catholic parents at Rossall, Lancashire, and



William Allen,
English cardinal

educated at Oriel College, Oxford, he was appointed principal of S. Mary's Hall, Oxford. He left England soon after the accession of Elizabeth

and was largely responsible for the foundation in 1568 of the college for English priests established at Douai and afterwards transferred to Reims. He began the translation of the Douai Bible. *See Bible.* The main aim of Allen's life was to restore Roman Catholicism in England. At first he worked quietly, training priests for propaganda work, and to the last his students had no political course of study, but about 1582 his own activities became definitely political. He supported Philip II and worked with the pope, Mary Queen of Scots, Guise, and certain of the Jesuits against Elizabeth. He signed, if he did not write, *An Admonition to the Nobility and People of England* (1588), which urged them to depose Elizabeth. In 1587 he was made cardinal, and in the event of the success of the Spanish Armada he was to become papal legate, lord chancellor, and archbishop of Canterbury. He resided at Rome from 1588 until his death, Oct. 16, 1594. *Consult* An Elizabethan Cardinal, Martin Haille, 1914.

Allen, Zachariah (1795–1882). American inventor. Born at Providence, Rhode Island, Sept. 15, 1795, he was educated at Brown University and became a barrister,

but abandoned law to enter industry. His inventive genius soon established him in Rhode Island. His most successful inventions were the hot-air furnace for central heating, 1821, and the automatic cut-off valve for steam engines, 1833. He is also memorable as the first person to calculate the available power of Niagara Falls. He died at Providence, March 17, 1882.

Allenby, Edmund Henry Hynman Allenby, 1st Viscount (1861–1936). British soldier. Born April 23, 1861, he was educated at Haileybury and entered the army, the Inniskilling Dragoons, in 1879. His earliest active service was in the Bechuanaland expedition of 1884–5, and he was in Zululand in 1888. He served with the Inniskillings throughout the South African War, and was selected in 1902 to command the 5th Lancers. The command of a brigade followed, and in 1914, when the First Great War broke out, Allenby was inspector-general of cavalry at Aldershot. He took out the cavalry division to France, was with it at Mons, and later, when it became a corps, took charge of it.

In 1915, being then a K.C.B., he succeeded Sir Herbert Plumer in command of the 5th corps, and when the battle of the Somme began had been appointed to the Third army. He led that force at the battle of Arras in 1917, but in June of that year was sent to take command of the expeditionary force in Egypt. He reorganized this after the check before Gaza, and was responsible for the campaign that drove the Turks from Palestine and



Field-Marshal Viscount Allenby,
whose campaign liberated Palestine
in the First Great War

recovered Jerusalem for the Christians in Dec. Next year he routed the Turks at Megiddo, Sept. 19, and took Damascus and Aleppo.

Full general by 1917, Allenby was in 1919 promoted field-marshal, was voted a sum of £50,000, and was created a viscount, adopting the title of Viscount Allenby of Megiddo and Felixstowe. For six years he was high commissioner of Egypt and the Sudan. He died suddenly on May 14, 1936. His only son had died of wounds in France in 1917, and a nephew, Dudley Allenby (b. 1903), succeeded to the viscounty by special remainder. See Palestine (p. 6300). Consult Allenby, Soldier and Statesman, F.-M. Visct. Wavell, 1946.

Allenstein. German and better known name of Olsztyn, capital of the Polish prov. of Masuria (*q.v.*). It is 62 m. S. of Kaliningrad (Königsberg). In mediæval times the h.q. of the grand master of the Teutonic knights, it was his official seat up to its capture by the Russians Jan. 22, 1945, in the Second Great War. A German army corps h.q. before the First Great War, it was captured by the Russians in Aug., 1914, but evacuated by them during the struggle around Tannenberg. It formerly manufactured cement, umbrellas, matches, etc. Pop. (1939) 45,000.

Allentown. City of Pennsylvania, U.S.A. The county seat of Lehigh co., it is on the Lehigh river. It is 60 m. by rly. N. by W. of Philadelphia, on the Philadelphia and Reading and other rlys. It manufactures furniture, silk, and cement, and has large ironworks, rolling-mills, and forges. Pop. 96,904.

Alleppi. Seaport of Travancore, extreme S. of India. It is 33 m. S. of Cochin, has a fine harbour, and exports coffee, coconuts, and spices. Pop 32,044.

Allergy. Term, originated by von Pirquet, meaning an altered tissue reaction resulting in a condition of unusual sensitiveness to a substance which is harmless in similar amounts for the majority of members of the same species. In some persons, the swallowing or breathing of certain substances, or even the mere contact with them, gives rise to more or less violent constitutional symptoms and local reactions. For example, the ingestion of egg-white produces no ill effects in most individuals, but in a few hypersensitive individuals a minute amount may produce either severe gastro-

intestinal disturbances, urticaria, eczema, or asthma. Contact with plant pollen will excite an attack of hay fever in a specifically sensitive person. Treatment of allergic conditions depends largely upon the discovery of the causative factor. The offending substances, called "allergens," are numerous and widely distributed. The term "allergy" is often popularly misused to describe a condition of intolerance to ordinary amounts of a substance producing an exaggerated, but not unusual, action, *e.g.* in a person intolerant to aspirin an ordinary dose may produce an exaggerated physiological effect, such as ringing in the ears, deafness, etc., whereas in an individual allergic to aspirin, a minute dose may produce unusual symptoms such as sneezing attacks, urticaria, or asthma. See Anaphylaxis.

Allerion. In heraldry, a beakless, legless eaglet, with wings opened, points usually downwards.

Allerton, WILLIAM LAWIES JACKSON, 1ST BARON (1840-1917). British politician. He was an M.P. for Leeds 1880-92, becoming chief secretary for Ireland, 1891, and receiving a peerage 1892. For over 20 years he was chairman of the Great Northern Rly.

Alleyne, EDWARD (1566-1626). English actor and founder of The College of God's Gift, at Dulwich. He was born in the parish of St. Botolph, Bishopsgate, London, Sept. 1, 1566, and the earliest mention of him as an actor occurs in 1586, and in 1592 Thomas Nash speaks of him as one of the four great contemporary performers. With Philip Henslowe (*q.v.*), whose stepdaughter, Joan Woodward (d. 1623), he married, he was a partner in the earl of Nottingham's company, known also as the Lord Admiral's company.

In 1600 the two partners built the Fortune Theatre in Golden Lane, Cripplegate, and in 1604 obtained a patent making them joint-masters of the royal game of bears, bulls, and mastiff-dogs. Between 1605 and 1614 Alleyne purchased from Sir Francis Carlton the manor of Dulwich for £10,000, and in 1613 began building the college, with chapel and almshouses, obtaining a royal charter for incorporating and endowing the charity in 1619. He died Nov. 25, 1626, and was buried in Dulwich College chapel. His favourite parts seem to have been the heroes of Marlowe's plays—the Jew of Malta, Tamburlaine, and Faustus—and Orlando in Greene's Orlando



Edward Alleyne, English actor and founder of Dulwich College
From original at Dulwich

Furioso. Consult Memoirs, J. P. Collier, 1841; Dulwich MSS.

All Fools' Day or APRIL FOOLS' DAY. The popular names for April 1, derived from the custom of playing practical jokes on that day, usually until noon. The origin of the custom, apparently unknown in Great Britain until the 18th century, is obscure. It is possibly connected with the festivities of the spring equinox, one of the features of the ancient Indian spring feast of Huli being an exact counterpart of European April fooling.

The custom may have arisen in Europe as a travesty of New Year gifts and visits, when the reformed calendar transferred the beginning of the year from April 1 to Jan. 1. In France an April fool is called a *poisson d'avril* (April fish), possibly because a young spring fish is easy to catch. An April fool is known in Scotland as a gowk (cuckoo), and April fooling as hunking the gowk, the cuckoo being reputed a foolish bird.

All for Love, or THE WORLD WELL LOST. Tragedy in five acts by John Dryden. Based on the story of Antony and Cleopatra (*q.v.*), it was produced at the Theatre Royal, Drury Lane, London, in 1678, and frequently revived, a notable modern revival being that of the Phoenix Society at the Shaftesbury Theatre, London, 1922.

All-Fours. An American card game, possibly the oldest. The name is derived from the four chances or points, called respec-

tively High, Low, Jack, and Game. A full pack of 52 cards is used, the ace being the highest and the deuce the lowest, both in play and in cutting for deal. The following are the points to be scored—*High*: The highest trump out; the holder scores one point. *Low*: The lowest trump out; the original holder scores one point. *Jack*: The knave of trumps; the holder scores one point, unless the card is won by an adversary, when the winner scores the point. *Game*: The greatest number of points contained in the tricks won by either player, reckoning thus, each ace, four; each king, three; each queen, two; each knave, one; and each ten, ten. The holder of the highest total scores one point towards the game.

The game is played by two or three persons, or four players in partnerships of two. The dealer, after being determined by cutting, gives six cards to each player, three at a time, after which he turns up the next card for trumps. The elder hand, if he dislikes his cards, has the privilege of saying "I beg"; in this event the dealer must allow him to score one point, or give each player three cards more from the pack and turn up the next for trumps. If the trump then turned up be of the same suit as before, he must continue giving each player three cards and turning up the next until another trump suit is shown. If a jack is turned up for trumps it counts one point to the dealer. Tricks are made exactly as in whist. When all the tricks are played out the points are counted for High, Low, Jack, and Game.

The skill of the game consists in winning the knave of trumps, taking the tens, and endeavouring to draw the adversaries' best cards. The points for high and low are scored by their original holder; the knave of trumps counts to the owner of the trick containing it. The number of points played for is usually 7, 9, or 11. High and low points may both be made by the same card, if the only trump out, and in the case of the knave it can count as High, Low, Jack, and Game.

Blind All-Fours is the game usually played by two persons, the first card led by the non-dealer establishing the trump suit. There is no begging, and the points played for are usually 7 or 9.

Allgemeine Zeitung, DIE (The General News). German daily newspaper. Independent liberal in tone, it was founded at Stuttgart by Johann Friedrich Cotta. Cotta

desired Schiller to be editor, but the paper appeared on Sept. 9, 1798, under the editorship of L. F. Huber. Suppressed by the duke of Württemberg in 1803, it moved to Ulm, and thence to Augsburg, where it attained European repute. In 1882 it was transferred to Munich. In 1908 it became a weekly, in 1912 a monthly periodical, and has since ceased publication. It was often confused with the Norddeutsche Allgemeine Zeitung, Bismarck's Berlin daily, which became the Deutsche Allgemeine Zeitung the day following the signing of the armistice in Nov., 1918.

Allgood, SARA (b. 1883). Irish actress. She was born in Dublin, Oct. 31, 1883, studied for the stage, and under the auspices of the Irish National Theatre Society made her début at the Royalty Theatre, London, 1904. At the Abbey Theatre (q.v.), Dublin, she subsequently created such parts as Molly Byrne in Synge's *Well of the Saints*, Widow Quin in the same dramatist's *The Playboy of the Western World*, and Cathleen in Yeats's *Cathleen-ni-Houlihan*. Her greatest successes, however, were achieved in London during the 1920s, in Sean O'Casey's *Juno and the Paycock*, and *The Plough and the Stars*.

All-Hallows, ALL-HALLOWMAS OR HALLOWMAS. O.E. name for All Saints' Day (q.v.). See also *Hallow-e'en*.

Allia OR ALIA, BATTLE OF THE. Fought July 16, 390 B.C., between the Romans and invading Gauls under their leader Brennus, on the banks of a small stream of that name, a tributary of the Tiber. The Romans were defeated, and the Gauls advanced and sacked Rome. The date of this defeat was afterwards known as *dies Alliensis* (day of Allia) and marked as unlucky in the Roman calendar.

Alliance (Lat. *ad*, to; *ligare*, to bind). Term applied generally to any compact between two or more states in regard to their common action or inaction in relation to other states. Of such historic compacts the majority have had no specific title.

The more important alliances down to the 17th century were generally called leagues. Later a small number bore the actual name of alliance. Of these the most notable were the Triple Alliance of 1668 between England, the United Provinces, and Sweden, directed to checking the aggression of Louis XIV.; the Grand Alliance of 1689, an extension of the League of Augsburg, a coalition between the Hapsburgs, Holland, and England against Louis XIV.; the renewed Grand Alliance of 1701, with the same object in view, which preceded the War of the Spanish Succession; the Quadruple Alliance of 1718 between Great Britain, France, Holland, and Austria against Philip V of Spain and the policy directed by Cardinal Alberoni.

Then, with an interval of nearly a century, came the various alliances against Napoleon, and after his overthrow the Holy Alliance, conceived by Tsar Alexander I of Russia as a league between the Christian princes, pledging them individually to rule their own subjects on Christian principles and mutually to support each other's authority. This alliance, from which England held aloof, embraced most of the monarchs of Europe, and was a dominating factor

in European politics during the ten years after Waterloo. After another long interval came the Triple Alliance between Germany, Austria, and Italy, which was formed in 1883 and came to an end in 1915. The name of the Triple Alliance has also been given to a compact made between Great Britain, Prussia, and Holland in 1788.

Powerful alliances faced each other in the First Great War. Germany and Austria-Hungary, survivors of the Triple Alliance of which Italy had been the third partner, were joined by Turkey and Bulgaria. These allies were generally known as the Central Powers. The opposing alliance originating in that between France and Russia, consisted before the end of the war of seventeen other nations, though not all actually participated in the fighting. They



Sara Allgood, one of the original Abbey Theatre players, in *Juno and the Paycock*

were (in order of the date of entry into the war) Belgium, Great Britain (and the British Empire), Serbia, Montenegro, Japan, Portugal, Italy, Rumania, the U.S.A., Cuba, Panama, Greece, Spain, Liberia, China, Brazil, Guatemala. The U.S.A. did not ally herself with the other Powers in the strict sense of the term, and the correct designation of this combination was therefore the Allied and Associated Powers. *See* First Great War, 1914-1918.

A new Triple Alliance was formed in 1919 between Britain, France, and the U.S.A., to safeguard France against aggression by Germany, but this was never ratified by the U.S. senate and so was of no great effect. In its place France built up a system of alliances with the "succession states," which also joined in the Little Entente (*q.v.*), and the Balkan Entente (*q.v.*). Germany retaliated in 1936 with the Anti-Comintern Pact with Japan, extended in 1937 to include Italy. The governments, real or "puppet," of several other states joined later. The Rome-Berlin Axis, originally a political gesture, became a military alliance between Germany and Italy in 1939.

For the Grand Alliance of the United Nations, signed originally by the representatives of 26 nations at Washington, Jan. 1, 1942, *see* Washington Declaration.

The oldest extant alliance is that between England and Portugal, concluded in 1373.

Alliance. City of Ohio, U.S.A., in Stark Co. On the Mahoning river, it is a junction on the Pennsylvania and other rlys., 57 m. S.S.E. of Cleveland. It has rolling mills, steel and boiler works, and manufactures machinery, etc. Pop. 22,405.

Allibone, SAMUEL AUSTIN (1816-89). American bibliographer. He was born at Philadelphia. His chief work was *A Critical Dictionary of English Literature and British and American Authors*, 3 vols., 1859-71, which contained notices of 46,499 authors. To the third volume Allibone affixed a brief Valedictory to be

reproduced in all editions of the work, and a series of forty indexes of over 75,000 names classified under different branches of literature. He was appointed head of the Lenox Library, New York, 1879, and died at Lucerne, Switzerland, Sept. 2, 1889.

Allied Expeditionary Force. Official name given to the forces of Inter-Allied Command organized for the invasion and liberation of German-occupied Europe in the Second Great War. On Dec. 24, 1943, it was announced that Gen. Eisenhower had been appointed Supreme Allied Commander of these forces. Other appointments, announced Dec. 27-29, included those of Gen. (later F.-M.) Sir B. L. Montgomery as C-in-C. of the British group of armies, Air Chief Marshal (later Marshal of the R.A.F.) Sir A. Tedder as Dep. Supreme Commander, Adm. Sir B. Ramsay as Allied Naval C-in-C., and Air Chief Marshal Sir T. Leigh-Mallory as Allied Air C-in-C. The last-named, lost in a plane accident in Nov., 1944, was replaced by Air Marshal Sir Keith Park. When Adm. Ramsay was killed in another plane crash, Jan. 3, 1945, he was succeeded by Vice-Adm. Sir H. Burroughs.

With the establishment of a western front following the Normandy landings of June 6, 1944, the composition of the Allied armies in France was as follows: The 21st army group (Gen. Montgomery) comprised the Canadian 1st army (Gen. Crerar) and the British 2nd army (Lt.-Gen. Dempsey). The latter army included the Polish 1st armoured div., the Belgian brigade, the Netherlands (Princess Irene)

brigade, and the Czecho-Slovak brigade. The 12th army group (Lt.-Gen. Bradley) comprised the U.S. 1st army (Lt.-Gen. Hodges), the U.S. 3rd army (Lt.-Gen. Patton), and the U.S. 9th army (Lt.-Gen. Simpson); and the 6th army group (Lt.-Gen. Devers) comprised the U.S. 7th army (Lt.-Gen. Patch) and the French 1st army (Gen. de Tassigny), both of which landed in the S. of France Aug. 15, 1944, being incorporated in the A.E.F. when they linked up the following month. The Allied 1st Airborne army (Lt.-Gen. Brereton) comprised U.S., British, and Polish divs.

In the initial stages Montgomery was in full command, but at the beginning of Aug., 1944, with the general advance into France of U.S. forces, Eisenhower moved his Supreme H.Q. (S.H.A.E.F.) to France, and Montgomery and Bradley each took over equal responsibility for his own separate army group. In March, 1945, the American 15th (Lt.-Gen. Gerow) was added to Bradley's command. In Dec., 1944, when the German counter-thrust into the Ardennes threatened the Allied front in Belgium, Montgomery was given temporary control of the four Allied armies N. of the German salient, *viz.* the British 2nd, Canadian 1st, and U.S. 1st and 9th, retaining control of the U.S. 9th for the Rhine crossing. S.H.A.E.F. was finally dissolved July 13, 1945. *See* Europe, Liberation of.

Allied Military Government. System of civil administration set up by the Allies in the later stages of the Second Great War, as enemy and enemy-occupied



Allied Expeditionary Force. Members of the Supreme Command at their headquarters, Feb., 1944. Left to right: Lt.-Gen. Omar Bradley, Senior Commander, American ground forces; Admiral Sir Bertram Ramsay, Allied Naval Commander; Air Chief Marshal Sir Arthur Tedder, Deputy Supreme Commander; General Dwight D. Eisenhower, Supreme Commander; Gen. Sir Bernard Montgomery, C-in-C. British group of armies; Air Chief Marshal Sir Trafford Leigh-Mallory, Allied Air C-in-C.; and Lt.-Gen. W. Bedell Smith, Chief-of-Staff

Photo, "The Times"

territory began to fall into their hands. It was first formed on the Allied occupation of Sicily in the late summer of 1943. Its object was to control and exploit the civil as well as the military aftermath of victory. Officials were recruited from men with professional experience of central and local government, many of whom had an extensive knowledge of European countries and were given special training courses in modern proconsulship. At the Moscow conference in Oct., 1943, the United Nations agreed to extend control organizations to Italy, under the general name of Allied Military Government of Occupied Territory, abbreviated to "Amgot." In all areas behind the combat zones "Amgot" was gradually replaced by Italian administration, exercised under the supervision of a control commission in four groups: military, political, economic and administrative, and communications. "Amgot" went forward with the 15th army group then fighting the Germans in Italy to organize the territory as the Germans were expelled. It pressed forward as a spearhead, taking charge of communities disorganized by the German retreat, restoring civil life, and clearing the way for further military action in the forward areas.

From Feb., 1945, the function of the control commission towards the Italian government was greatly modified in favour of the latter. Thenceforward Italy conducted her relations with other governments directly, not through the commission. She became free to appoint and receive ambassadors to and from all Allied and neutral countries and was given sole responsibility for administrative appointments. The Allied control commission in Italy officially ceased to function as from Feb. 1, 1947.

In Germany, Allied Military Government was first established in the Aix-la-Chapelle and Trier districts of Germany in Sept., 1944. Eisenhower, supreme Allied C.-in-C., in a broadcast to the people of W. and S.W. Germany, stated that supreme legislative, judicial, and executive authority and powers were vested in himself as supreme commander and military governor; and that German courts and educational institutions within the occupied territory were suspended. All officials were commanded to remain at their posts until further orders and to

obey and enforce all orders of the military government or the Allied authorities.

The first trial to be held on German soil by the Allied military court was on Sept. 27, 1944, at Kornelimünster, in the Aix-la-Chapelle area, when four German civilians were charged with violating Allied restrictions on travel, and two others with the unauthorized sale of coal. On Oct. 18 it was stated that a code of 70 laws, already in application in the occupied areas of the Reich, were to be applied with the extension of further territory and would be put into operation by "teams" of Anglo-U.S. officers.

With the establishment of the Allied Control Commission in Berlin, June 5, 1945, the work of Allied Military Government in Germany was gradually superseded. See Germany.

Allier. River of central France. Rising in Lozère and flowing N.N.W. through Haute-Loire, Puy-de-Dôme, and Allier departments, it joins the Loire about 4 m. below Nevers. Of its 356 m., 140 m. are navigable.

Allier. Department of central France. Its area is 2,848 sq. m. Bordered by the Loire, traversed by the Allier, and embracing some of the richest land in France, it produces wine, cereals, oil, roots, cattle, and timber, and is rich in coal, iron, manganese, antimony, copper, marble, granite, and potter's clay. It contains the town of Vichy (q.v.). Moulins is the capital. Pop. 368,778.

Alligator (Span. *el lagarto*, the lizard). Genus of the crocodile family. It is distinguished from the true crocodile by the fact that the fourth tooth from the front on each side of the lower jaw fits into a cavity in the upper jaw and is not seen when the mouth is closed. Of the two living species the Chinese alligator is comparatively small and only recently known to science. The Mississippi alligator, which attains 16 ft. in length, is an inhabitant of the southern states of N. America, lives in the rivers, and feeds mainly on fish, though it levies a heavy toll

on animals that come down to drink. The eggs, which may amount to 100 from one female, are laid among the bushes on the banks and covered with decaying vegetable matter. The heat of the sun hatches them, and the female watches her nest and conducts the young to the water.

Alligators have been so much hunted for their hides that their numbers have greatly decreased.

Alligator Pear. Fruit of *Persea gratissima*, a tree of tropical America and the West Indies,

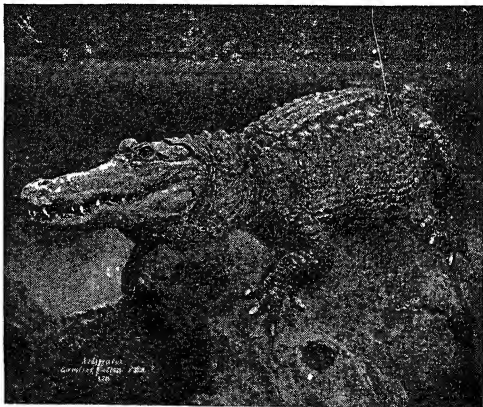


Alligator pear, or Avocado pear

belonging to the order Lauraceae. It is also known as Avocado pear. It is a pear-shaped berry, externally brownish or purple, and filled with an oily pulp-like butter or marrow, which is highly esteemed when eaten with limejuice, spice, or pepper and salt. Valuable oil may be expressed from the pulp.

Allighan Case. For the proceedings of a British parl. committee of privileges appointed 1947, concerning the M.P. for Gravesend, see N.V.

Allingham, WILLIAM (1824–89). British poet. Born at Ballyshannon, Donegal, of an English family, he was engaged in the Customs, first in England and then in Ireland. He retired in 1870, and in 1874 became editor of Fraser's Magazine. He was intimate with the pre-Raphaelite group, and his second volume of poems, *The Music Master*, 1855, a



Alligator of the rivers of the southern states of North America, a reptile which sometimes attains a length of 16 ft. Gambier Bolton, F.Z.S.

revised edition of *Day and Night Songs*, 1854, was illustrated by woodcuts from designs by Rossetti, Millais, and Arthur Hughes. Of his other poems, Laurence Bloomfield in Ireland, 1864, and Irish Songs and Poems, 1887, are notable.



William Allingham,
British poet

He married in 1874 Helen Paterson (1848-1926), who as Mrs. W. Allingham was a well-known water-colour painter. He died Nov. 9, 1889. See *Diary*, ed. H. Allingham and D. Radford, 1907.

Alliteration (Lat. *ad*, to; *litera*, letter). Repetition of the same initial letter in words in close juxtaposition. Alliteration was a structural part of the versification of the Anglo-Saxon, Middle English, and Gothic languages generally, a regular characteristic of Icelandic verse, and was employed by several of the Oriental nations. The general rule for the employment of alliteration in early English poetry is that in each couplet three emphatic words, two in the first line and one in the second, begin with the same letter, the alliteration in the second falling on the first emphatic word, e.g.:

Deth cam drivynge after,
And al to dust pashed
Kynges and knyghtes,
Kayseres and popes.

For at least two centuries after it had ceased to be a structural part of English verse, the best writers continued to employ it, Spenser frequently with happy effect, as in his line, "Gay without good is good heart's greatest loathing." Nevertheless when, from having been structural, it became merely ornamental, it was liable to abuse and gradually fell into disfavour. Shakespeare satirised this abuse in *Love's Labour's Lost*, where Holofernes says: "I will something affect the letter for it argues facility. The praiseful princess pierced and pricked a pretty pleasing pricket."

In classical poetry alliteration makes only a slight appearance. Cicero collected some specimens from the early Roman poets, Ennius and Accius, but it appears to have been regarded as a blemish. The structure of Latin, however, facilitates alliteration, and after the revival of literature it found its way into the humorous Latin verse of the 16th century. One famous instance is the *Pugna Porcorum*,

or *Battle of the Pigs*, a poem of several hundred verses in which every word begins with the letter *p*.

In English prose, alliteration was brought to the highest point of mechanical perfection by John Lyly, whose novel *Euphues* gave the name to the literary form Euphuism. Lyly employed it as a structural part of prose, but his imitators, finding the trick an easy one, carried it to extremes, and overlaid their work with an excess of meretricious ornament. During the 17th century it gradually disappeared, and its former existence as a structural part of versification seems to have been forgotten so completely that Waller was credited by one critic with an invention which he only re-introduced. The revival of alliteration may be said to be due to Dryden, since whose day it has been used with supreme skill and subtle effect by such masters of technique as Tennyson and Swinburne.

Alloa. Municipal and police burgh and seaport of Clackmannanshire, Scotland. On the N. bank of the Forth, 32 m. W.N.W. of Edinburgh, it is served by two main lines of the Scottish region of British Rlys. (the river being crossed by a long bridge). Its buildings include a town hall, county and municipal offices, and a parish church, and it has yarn, brewing, distilling, glass, and



Alloa arms

hosiery industries. There is a small harbour with ferry service to South Alloa and its timber yards. Close



Alloa, Scotland: the old church
Valentine

by are the earl of Mar and Kellie's seat, Alloa Park, and Alloa Tower (98 ft. high), the ancient residence of the earls of Mar. Market day, Sat. Pop. 18,244.

Allobroges. Celtic tribe formerly inhabiting S.W. France and the adjacent parts of Switzerland. Their home was between the Rhône and the Isère, where now the cities of Vienne, Grenoble, and Geneva stand. The Romans crushed them in 121 B.C. but they were troublesome vassals.

Allocution (Lat. *ad*, to; *loqui*, to speak). Term used by the Vatican for any important pronouncement by the Pope to the cardinals assembled in a consistory. These allocutions are afterwards usually affixed to the doors of S. Peter's. The address read by a candidate on his admission to the French academy is also called an allocution. See *Consistory*.

Allon, HENRY (1818-92). British Congregational divine. Born at Walton, near Hull, Oct. 13, 1818, and apprenticed to a builder, he joined the Congregationalists. Displaying marked gifts as a preacher, he became a student at Cheshunt College, whence in 1844 he was called to be assistant minister at Union Chapel, Islington, of which he was sole pastor from Feb., 1852, until his death, April 16, 1892. Twice president of the Congregational Union, he edited the *British Quarterly Review*, the *Congregational Psalmist*, and the *New Congregational Hymn-Book*.

Allopathy (Greek *allos*, other; *pathos*, feeling). Medical term for the method of treating diseases by creating a condition different from the symptoms of the disease to be cured, the converse of homoeopathy. The word was first used in the early 19th century by the homoeopaths, the adherents of the new school of medicine invented by Samuel Hahnemann, to denote the traditional school.

Allori, ANGELO (1502-72). Florentine painter and poet. Born at Monticelli, he assisted Jacopo Carucci da Pontormo in the decoration of the church of San Lorenzo in Florence. He painted in fresco and oils, forming his style to some extent on that of Michelangelo. He painted the portraits of Dante, Petrarch, and Boccaccio. He was known, owing to the colour of his complexion, as *Il Bronzino*, or the sun-burnt. His nephew, Alessandro Allori (1535-1607), and his grand-nephew, Cristoforo Allori (1577-1621), were also painters, the latter's Judith with the Head of Holofernes being well known.

Allotment. In company law, the act of formally assigning newly created capital—e.g. shares or debentures—to applicants. By English law previous to 1900 the promoters of a company could go to allotment, however little capital had been applied for; but in 1900 the Companies Act was strengthened to prevent the scandals often arising from this procedure. In public issues now, so much of the desired capital, such amount to be named in the prospectus, must be applied for, or the allotment cannot take place and the money sent on application must be returned within forty days. A letter of allotment constitutes a contract; it is the final stage in the process of which the application is the first, and cannot be repudiated. It must bear a duty stamp; twopence if the nominal value of the shares allotted is less than £5, and one shilling if £5 or more. See Company Law.

Allotments. Small plots of land chiefly used for the cultivation of vegetables. The definition usually accepted is that laid down in the Allotments Act, 1922: "Any parcel of land, whether attached to a cottage or not, of not more than 2 acres in extent, held by a tenant under a landlord and cultivated as a farm or a garden, or partly as a garden and partly as a farm." The Allotments Act, 1925, enabled local authorities to let allotments up to 5 acres in extent. But these are more like small holdings. They are few in number and are mainly confined to the more rural counties.

Usually what is meant by an allotment is an "allotment garden." This parcel of land is defined by the Act of 1922 as "an allotment not exceeding 40 poles ($\frac{1}{4}$ of an acre) in extent which is wholly or mainly cultivated by the occupier for the production of vegetable and fruit crops for consumption by himself or his family." This popular type of plot exists in large numbers in all parts of the United Kingdom. The date of origin cannot be determined with certainty. It is known that experiments in their use were tried out, with considerable success, as a means of relieving prevailing distress amongst poor people nearly 200 years ago. Parliament evidently appreciated their value even in those early days, for many of the Poor Laws passed during that time make provision for the use of land for allotments. The earliest instance of allotments being pro-

vided under an Enclosure Act was in 1806 when 8 acres of land were allotted for this purpose. The first Allotments Act proper was placed on the Statute Book in 1831.

Before the First Great War the number of allotments was very small and the movement mainly a rural one. But the urgent war-time need for augmenting the nation's food supplies stimulated development in towns and cities, and its aspect rapidly changed from rural to urban. The peak year was reached in 1920 when $1\frac{1}{2}$ million plots were being cultivated, largely stimulated by Cultivation of Lands Orders. When these Orders were withdrawn and large tracts of land

to produce the maximum quantity of vegetable food. It is estimated that the united efforts of these small producers succeeded in raising during the Second Great War at least 100 million pounds' worth of food to supplement the nation's larder. In addition to the existing allotments many new ones were laid out in every kind of available site—in public parks and recreation grounds, on commons, on land surrounding R.A.F. stations and army camps and gun-sites, and even in many of London's residential squares.

Well planned, and properly cultivated, a small allotment garden of 10 rods (a little over 300 sq. yds.) will provide enough

vegetable food to supply a small family for nearly a whole year. Local authorities are under a statutory obligation to provide allotment gardens up to $\frac{1}{4}$ of an acre on the application of 6 registered parliamentary electors or ratepayers resident in their districts. A large proportion of allotments under cultivation in 1945 were occupied only temporarily, but efforts were being made in most places to alter this. Many local authorities began to make provision for permanent allotments in their post-war planning schemes, as they looked upon them not only as a

ROTATION OF CROPS ON PLOT 90' x 30'

C	DWARF PEAS	3 ROWS	Intercrop with Spinach (2 Rows), 6 in. between plants and follow with Leeks (4 Rows), 1 ft. apart, 9 in. between plants
		3 in. between plants	
		2 ROWS	
		9 in. between plants	
G	DWARF BEANS	8 ROWS	Follow with Spring Cabbage (4 Rows), 1 ft. 6 in. apart, 1 ft. 6 in. between plants
		6 in. between plants	
		2 ROWS	
		6 in. between plants	
M	ONIONS	1 DOUBLE ROW	Follow with Winter Lettuce, 1 ft. between rows, 9 in. between plants, intercrop with Summer Lettuce, 9 in. between plants
		1 ROW	
		1 ROW	
		1 ROW	
A	PARSNIPS	3 ROWS	Follow with Turnip. Rows 1 ft. apart, 6 in. between plants
		6 in. between plants	
		5 ROWS	
		6 in. between plants	
P	POTATOES (Early)	3 ROWS	Intercrop with Early Carrots (2 Rows), 6 in. between plants and Early Beet (1 Row), 6 in. between plants
		1 ft. between plants	
		6 ROWS	
		1 ft. 3 in. between plants	
S	SPINACH BEET or SEAKALE BEET	1 ROW	Precede Beet with Early Dwarf Peas (1 Row), 3 in. between plants
		1 ROW	
		1 ROW	
		1 ROW	
B	CABBAGE (Winter)	3 ROWS	
		2 ft. between plants	
		2 ROWS	
		2 ft. between plants	
W	BRUSSELS SPROUTS	2 ROWS	
		2 ft. 6 in. between plants	
		2 ROWS	
		2 ft. between plants	
S	SPROUTING BROCCOLI	2 ROWS	
		2 ft. between plants	
		2 ROWS	
		2 ft. between plants	
W	KALE	2 ROWS	
		2 ft. between plants	
		2 ROWS	
		2 ft. between plants	
S	SWEDES	2 ROWS	
		6 in. between plants	
		2 ROWS	
		6 in. between plants	
W	GLOBE BEET	2 ROWS	
		2 ROWS	
		2 ROWS	
		2 ROWS	

Allotments. Scheme based on one devised by the ministry of Agriculture for the profitable cultivation over three years of a plot 30 yards long by 10 yards wide

had to be surrendered, numbers began rapidly to decline.

At the outbreak of the Second Great War they had shrunk far below the million mark. An intensive "Dig for Victory" campaign conducted by the ministry of Agriculture and Fisheries and supported by the National Allotments Society and other interested bodies, succeeded in restoring the position to the 1920 peak figure. Between the two wars about four million new houses had been built, many of them with large gardens, and the occupiers were now urged to combine with the allotment holders in an effort

means of augmenting the nation's food supplies, but also as being of great social and recreational value. Some local authorities decided to lay out their post-war allotments in such a way as to make an important contribution to local amenities, a policy which was encouraged by town planners.

The lines along which the development of allotments should proceed were indicated in a recommendation made in the Lord Justice Scott Report on land utilisation in rural areas, 1942, para. 202: "As far as possible tracts of good soil in the neighbourhood of towns and villages

shall be kept for the dual purpose of open spaces and market gardens and allotments, and accordingly allotment holders shall have security of tenure instead of the liability of being displaced by housing development."

G. W. Giles

Allotropy (Gr. *allos*, other; *tropos*, turn). Term denoting the property in certain chemical elements of existing in different solid forms. The differences may be in density, colour, crystalline form or other properties. Thus, carbon exists in three allotropic varieties, two crystalline (diamond and graphite, of different densities) and one amorphous, charcoal. Charcoal is not a pure element as it contains a little hydrogen, probably adsorbed. Its carbon content seems to be similar in structure to graphite.

Graphite is soft and its structure consists of parallel layers of hexagonal plates with carbon atoms at the corners of each hexagon. The separation of the molecular layers accounts for the softness of graphite and its tendency to flake. Graphite has a density of about 2.5; diamond about 3.5. The latter is very hard, translucent, colourless or slightly yellow, and its crystals are of the cubic system. In them each carbon atom is surrounded, and attracted, by four other atoms arranged at the angles of a regular tetrahedron. These allotropic differences are due to the differing arrangements of the atoms in the solid substance.

Allotropy occurs in many other elements. There are, for instance, three forms of sulphur (two crystalline, one plastic), two forms of phosphorus (yellow and red), three forms of tin (one ductile in tetragonal crystals, one brittle in rhombic crystals, and a third in powder form). Ordinary tin, if kept at a low temperature, may take the third, or powder, form, and pewter is thus spoiled at prolonged low temperatures by the formation of powdery spots or lumps.

Allowance. English law term used in several senses. (1) In many cases people are liable at law for allowing things to be done. Thus, the highway authority must not allow an obstruction to remain on a highway; the owner of a ship must not allow her to be overloaded; the owner of a horse must not allow it to be worked if it is unfit. In all such cases, the person sought to be held responsible for allowing must be proved to have given his sanction to it, by some

means direct or indirect. *A fortiori* he must know of it, because a man cannot allow a thing of which he has no knowledge. (2) In actions for the redemption of mortgages, the mortgagee is entitled to be paid, under the head of just allowances, all he has spent on or in connexion with mortgaged property, provided that the money has been reasonably or necessarily spent. Allowances always allowed include insurance premiums, and the cost of necessary repairs, but not improvements. Many other expenses may be allowed, even the costs of defending an action in which plaintiff attacked the title to the property. (3) The term just allowances is used in many other Chancery suits where accounts have to be taken, e.g. administration actions, partnership actions, and the like.

Allowances. Literally anything allowed, but the term is most frequently used in a monetary sense. It contains the suggestion of a voluntary payment and one made for no specified services, being thus different from a salary or a pension. Thus we speak of a wife's allowance. The word is used, however, for certain payments which are not voluntary, for instance, those made by the State to the wives, children, and other dependents of soldiers and sailors on active service, known as separation allowances. The reason for this is that they originated in voluntary allowances made by the soldier or sailor. The word is also used for the rebates or concessions allowed to payers of income tax on account of wives, children, and other dependents, or in respect of earned income: there is also a "personal" allowance. *See* Separation Allowances.

Alloway. Village of Ayrshire, Scotland. On the right bank of the Doon, 2½ m. S. of Ayr, it contains the cottage, now a museum, in which Robert Burns was born. The Auld Brig and a new bridge cross the Doon, and a monument stands near the ruined "haunted kirk," the scene of The Witches' Dance in Tam O'Shanter. *See* Burns, Robert.

Alloxan OR MESOXALYLUREA. Substance in the form of white crystals prepared by oxidising uric acid with nitric acid. A weak solution of alloxan is used as a skin "blush," as it has the property of gradually turning pink in contact with the secretion of the skin. A study of the condensation products of alloxan and uric acid first showed the rela-

tionship between uric acid and the alkaloids of coffee and tea.

Alloxantin. Crystalline substance prepared by the action of dilute nitric acid on uric acid. With baryta water a violet-blue precipitate is obtained, the colour disappearing on boiling. These reactions are used as delicate and characteristic tests for uric acid.

Alloy. Term derived from the Latin *ad* to, and *ligare*, to bind, applied (1) to the artificial compound formed by the mixing of two or more metals, usually in a state of fusion; and (2) to a base or inferior metal when mixed with a more valuable one. Brass, a compound of copper and zinc, is an example of the former sense of the word; the copper used in a small proportion with gold in the preparation of the British sovereign, of the latter.

The alloys of metals are numerous, and of great industrial importance and scientific interest. Innumerable as are the metal objects of industrial, domestic, and artistic use, none is pure, while most are deliberately formed mixtures or compounds. Iron, in the cast form, contains an appreciable percentage of carbon, and owes some of its valuable properties to that fact. Steel is iron containing a definite proportion of carbon, and in certain cases small proportions of metals, e.g. nickel, manganese, chromium, vanadium, silicon, tungsten, tellurium, and so on. All the varieties of steel in use, from penknives to armour plate, are varying alloys of iron with carbon or carbon and certain metals. The two metals most generally used in the arts in a state of practical purity are lead and copper. Bronze, one of the earliest forms of metals used by prehistoric man, is an alloy. The Chinese attained great skill in the art of alloying metals at a very remote period.

We have alloys in every condition, from a true chemical compound to a loose mechanical mixture, many appearing to be solidified solutions of one metal in another. The influence of mass in the formation of alloys, a question raised by Bergman and Berthollet early in the 19th century, is possibly greater than has been appreciated. The presence of a thousandth part of bismuth in copper would make a copper cable unsuitable for electrical use, while the presence of a two-thousandth part of bismuth in gold would reduce its tensile strength from about 7 tons

to the sq. in. to $\frac{1}{2}$ ton. Equally small additions and variations in iron will entirely change the physical properties of that metal. The question whether the action of such a minute quantity of metal in masses of others is chemical or physical is very difficult to determine. There appears to be no doubt that the action, perhaps in most cases, is allotropic.

For practical purposes an alloy may be regarded as a new metal. It will be found to have the characteristic properties of metals, e.g. metallic lustre, malleability, tenacity, ductility, and conductivity of both heat and electricity. Its physical properties, however, may differ widely in degree from those of the metals composing it. Where lead, tin, or zinc are among the principal constituents of an alloy, those metals will impart to the alloy their physical properties in proportion to their relative amounts, while the electrical conductivity of the alloy will be proportionate to the relative volumes of the component metals. Generally, the specific heat of alloys will be the mean of those of the component metals.

Greater Tensile Strength

On the other hand, the melting point of an alloy is lower than the mean of those of its constituents, and sometimes lower than that of the most fusible of the components. The specific gravity is scarcely ever the mean, while the tensile strength is generally greater, sometimes much greater. Thus, if pure gold, which has a tensile strength of about seven tons to the sq. in., be alloyed with 10 p.c. of copper its tensile strength will be raised to 18 tons per sq. in., which is much higher than any calculation of the mean strengths of the two metals could give. The alloy is also usually harder than any of the principal metals composing it. The metal platinum is insoluble in nitric acid, but an alloy of platinum and silver is completely dissolved.

The most important alloys are the alloy steels, containing nickel, chromium, tungsten, and other metals in addition to carbon; the copper alloys such as brass (containing zinc) and bronze (containing tin); and the light alloys based upon aluminium and magnesium with up to about 10 p.c. of added metals, chiefly copper, zinc, nickel, silicon, and magnesium (Al. alloys) or aluminium (Mg. alloys). The demands of the aircraft industry for structural

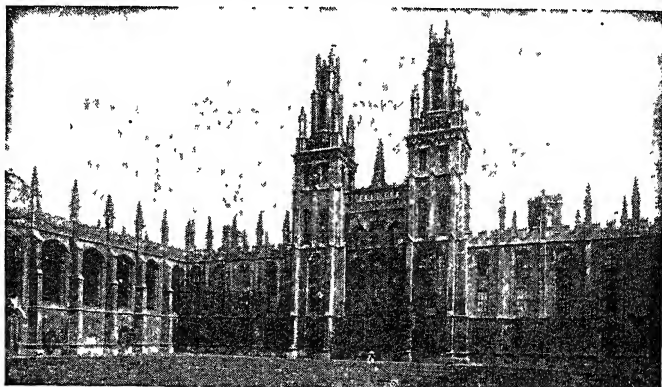
materials to give the highest possible strength/weight ratio have led to the development of alloys with specific gravities below 3 and with tensile strengths up to 40 tons per sq. in. in wrought form. Duralumin was the first of this class of alloy which depends for its remarkable properties upon some form of heat treatment, commonly known as age-hardening. Where metals of high melting point are involved, it is now common practice to produce alloys in finished form by means of powder metallurgy. In this process the metals in finely divided form are mixed together in the desired proportions and moulded into the finished shape in a steel die under high pressure. The articles thus formed are then heated to a temperature just below the fusion point, and "sintered" to form a compact mass by diffusion and recrystallisation. Metals and non-metals can also be bonded together in this way, but such a mixture can hardly be called an alloy.

Practically all the more important alloys used in industry are now covered by B.S.I. specifications which lay down the limits of composition and the

All Saints' Day. Festival of the Christian Church celebrated on Nov. 1 and known formerly in Great Britain as All-Hallows. It originated in A.D. 608, when the Pantheon at Rome was converted to Christian uses, as the Church of the Blessed Virgin and All Martyrs, by Pope Boniface IV, but was not formally instituted until 835. It is a day of obligation for Roman Catholics, and is ordered to be observed in the Church of England. Many superstitions, dating from the pagan festival of Nov. 1, are connected in Scotland with Hallow-e'en, the vigil of All Saints'. In the Greek Church a similar festival is observed on the Sunday after Easter.

Allsopp. Name of a family of Burton brewers. The founder of the business of Samuel Allsopp & Sons was Samuel Allsopp (d. 1838). His son Henry made it one of the greatest concerns of the kind in England. M.P. for Worcestershire from 1874 to 1880, Henry Allsopp was made a baronet in 1880, and in 1886 a peer as Baron Hindlip. He died April 3, 1887.

All Souls College. Oxford college, unique because it consists almost wholly of fellows, having only four undergraduates. Founded



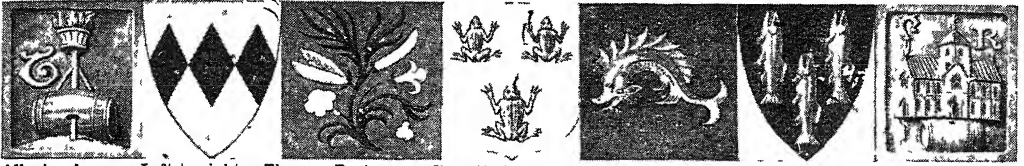
All Souls College, Oxford, founded in 1438, in memory of Agincourt, and styled the College of the Souls of all the faithful departed

Frith

properties, while the more recently developed alloys, particularly the light alloys, are covered by D.T.D. specifications (issued periodically by the ministry of Supply), which also lay down heat treatment procedure and methods of test. Although most alloys are normally produced by melting together the metals of which they are composed, some alloys are produced by direct simultaneous reduction from their mixed ores or from an ore which contains them both. Monel metal is a typical example of the latter.

in 1438 by Henry Chichele, archbishop of Canterbury, its forty to fifty fellows include many men of great distinction. Some of them are chosen after examination; others are the holders of university professorships; while others are elected for special reasons or attainments. The head is called the warden, and the four undergraduates are known as bible clerks. The entrance is in Catte Street.

All Souls' Day. In the Roman Catholic Church, day set apart as one of prayer for the souls of all



Allusive Arms. Left to right: Thomas Beckynton, T. with fire beacon in tun; Montacute, sharp mountain peaks; Plantagenet, broom plant (*Planta genista*); Botreux, Cornish family, a botru in Cornish dialect meaning a toad; Dauphin (dolphin), medieval; De Lucy, three lances (pike); Abbot Robert Kirton, church (kirk) on tun, with pastoral staff and R

the faithful departed. It is observed on Nov. 2, and originated in the abbey of Cluny, A.D. 998. Omitted from the English Prayer Book at the Reformation, its restoration was asked for in 1919 by the lower house of Convocation. In France and Italy the day is known as Day of the Dead.

Allspice. Pea-like berries of *Pimenta officinalis*, a tropical American shrub of the family Myrtaceae. It is cultivated in the W. Indies and Jamaica. The name allspice is due to its fragrance and taste being supposed to combine those of cinnamon, cloves, and nutmeg. It is also known as Jamaica pepper. The berries are picked unripe and dried in the sun.

Allston, WASHINGTON (1779-1843). American painter and author. Born at Waccamaw, S. Carolina, Nov. 5, 1779, he was educated at Harvard and studied in London and Rome. In 1814 his big canvas, *The Dead Man Revived by Touching Elisha's Bones*, was awarded a premium of 200 gs. by the British Institution. His powers were well displayed in Spalatro's Vision of the Bloody Hand, Saul and the Witch of Endor, and the unfinished Belshazzar's Feast. He was elected an A.R.A. in 1818, and returned to America the same year. He was also the author of *The Sylphs of the Seasons with Other Poems*, 1813, and a romance of Italian life called *Monaldi*, 1841. He died at Cambridge, Mass., July 9, 1843. See *Life*, J. B. Flagg, 1893.

All's Well That Ends Well. Romantic comedy by Shakespeare. Helena, the daughter of a physician, after curing the king of France of an illness deemed incurable, is rewarded by the hand of Bertram, count of Rousillon. Assured by Bertram that he will never acknowledge her as his wife until she can show him a ring which he wears, she contrives, by taking the place at an assignation of another lady to whom he has given the ring, to secure both it and him. The scenes are laid partly in France and partly in Tuscany. Comic relief is furnished by Parolles and by a clown of the household of the count's mother.

Probably identical with Love's Labour Won, mentioned in Francis

Meres' *Palladis Tamia*, 1598, and written about 1595-1601, the play was first printed in the 1623 folio. In five acts, it is based on Boccaccio's *Giletta of Narbona* (*Decameron*, Day III, Novel 9), a version of which appeared in William Painter's *Palace of Pleasure*. 2nd issue 1567. The action covers 11 days, spread over a period of three months. The play contains 2,981 lines, of which 1,453 are prose, 1,234 blank verse, and there are 280 pentametric rhymes. It has never been popular on the stage. At Drury Lane, Dec. 12, 1793, J. P. Kemble played Bertram; King, Parolles; and Mrs. Jordan, Helena. An Italian play by Bernardo Accolti, based on the same story, was printed in Florence in 1513.

All The Year Round. Weekly journal started by Charles Dickens, April 30, 1859. With No. 5 *Household Words* was incorporated. Dickens's *A Tale of Two Cities* and *Great Expectations*, Wilkie Collins's *The Woman in White*, No Name, and *The Moonstone*, Charles Reade's *Hard Cash*, Bulwer Lytton's *A Strange Story*, and Mrs. Gaskell's *A Dark Night's Work* appeared first in this periodical. Dickens bequeathed his share and interest in it to his eldest son, who con-

ducted it until April, 1895. It was then absorbed in a new paper bearing the old title of *Household Words*. The Christmas Stories from *All The Year Round* were issued in volume form in 1879.

Allusive Arms. In heraldry, arms, known as *armes parlantes*, canting arms and punning arms, having charges with names suggesting, or alluding to, the name or title and sometimes the office or profession of the bearer. Numerous celebrated examples are connected with territorial insignia, e.g. the castles and lions of the kingdom of Castile and Leon, the ox crossing a ford on the shield of the city of Oxford, the embowered and embattled fess (a bridge) over blue water on the shield of Cambridge, and the ox in the arms of Turin (Torino, *toro*, bull).

Among personal arms may be cited the old shields of the Troutbecks, adorned with a wreath of trout; of the Lucys, displaying three pikes (known of old as *lucres*); of the Trusbuts, barons of Wartre, bearing "trois boutz d'eau," three water-bougets (or water skins); and the barbel on the shields of the counts of Bar. Elephants are seen on the shield of the Oliphants, wolves on those of Wolf and Wolsey, pears and cherries on those



All's Well That Ends Well. An artist's rendering of the dramatic moment when Helena says, "There is your ring, and, look you, here's your letter"

Painting by Francis Wheatley, R.A.

of the Pearys and Cherrys, strawberry flowers (traises) on that of the Frasers, while some of the Baines made use of crossed thigh bones.

Alluvion (Lat *ad*, to; *here*, to wash). Term used to describe additions to land bordering on the sea or a river caused by the imperceptible silting up of the soil. If the accretion is sudden, it is called dereliction. In the case of alluvion, the increase belongs to the lord of the land to which the alluvion attaches, but not in dereliction, *e.g.* where the sea, or a tidal river, suddenly recedes.

Alluvium. Matter derived from the natural waste of rocks. It is carried by running water and deposited where the flow of water becomes insufficient to support the load. Alluvium will be deposited on the convex banks of meandering streams, at the point where a river enters a larger sheet of water, such as a sea or lake, and also over areas adjacent to rivers liable to floods. Marine alluvium is deposited on coastal platforms forming beaches, and on tidal flats forming salt-marshes.

Allyl. Organic radical. Allyl sulphide is known as oil of garlic. Oil of mustard is allyl isothiocyanate; the "mustard gas" employed by the Germans in gas shells during the First Great War was dichloroethyl sulphide.

Alma. River of Russia, in the Crimea. Its length is about 45 m., and it enters the Black Sea 18 m. N. of Sevastopol.

Alma, BATTLE OF THE. First pitched battle of the Crimean War, fought Sept. 20, 1854. On one side were 35,000 Russians under

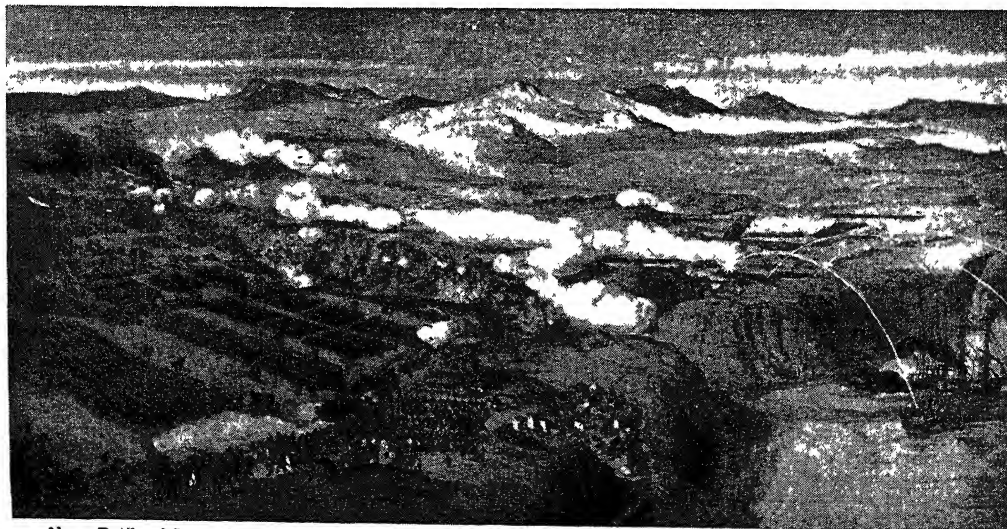
Prince Menshikoff, and on the other 30,000 French under Marshal St. Arnaud, 25,000 British under Lord Raglan, and a few thousand Turks.

Having landed without hindrance on the Crimean Peninsula, the Allies set out for Sevastopol, some 20 m. away. To stop them the Russian army was drawn up on and behind the hills across the little river Alma, these being most precipitous at the right or seaward end. The plan was for the British and some of the French to advance against the Russian front, while the rest of the French with the Turks climbed the hills near the sea and turned the enemy's flank, this attack being supported by the fire of the warships, and being made along routes which the Russians thought impassable, at least to guns. The British divisions moved forward in line—riflemen in front, guns and cavalry on the exposed flank. Preceded by chasseurs, the French advanced in column, and a halt was called to give the flanking party time to get into position.

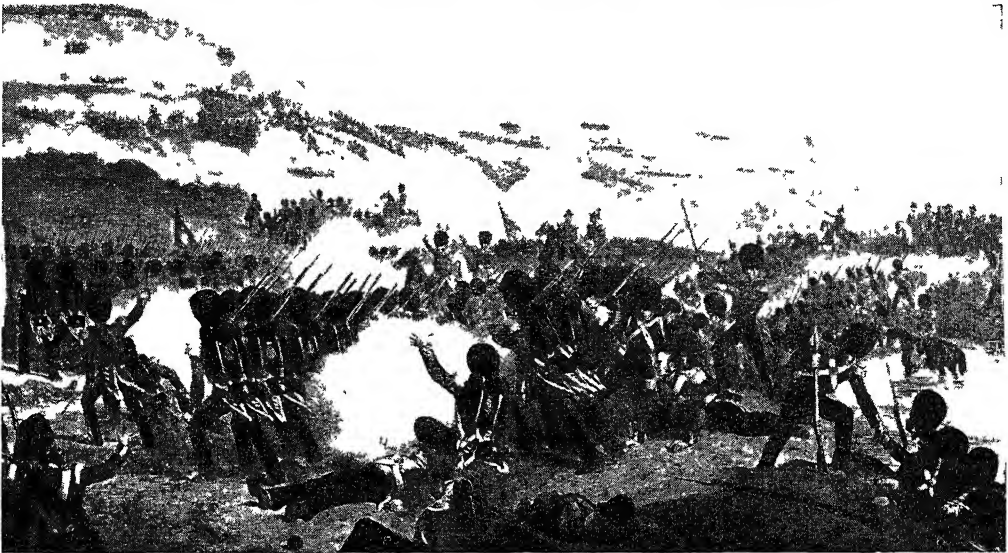
By this time the Allies were near enough to suffer many casualties from the Russian guns. Soon the advance was resumed. The unexpected appearance of the French on their flank alarmed the Russians, while other French divisions were moved away to the right to push home this advantage. Two British divisions, the Fusilier and the Light, therefore went forward alone against the Russian centre. They crossed the Alma without serious difficulty, and then the real struggle began. Under

heavy fire they pushed on past the burning village of Burluk, and some way up on the hill five battalions of Fusiliers seized a redoubt, from which after some desperate fighting the Russians hurriedly withdrew their guns. Before the supporting divisions, Guards and Highlanders, could get near, the Russians bore down on the five battalions, among whom a mistaken order to retire caused much confusion. This, however, was obeyed, but happily the reverse did not extend to the division on the left, which cleared the enemy from the hillsides. Falling back, the Fusiliers crashed into the Scots Fusilier Guards, who were thrown into disorder. But the other battalions marched on steadily; their fire told upon the enemy's columns; the French, after some delay caused by the congestion of men and guns on narrow hill-tracks, were moving forward; and the Russians soon began to withdraw. There was no real pursuit, but the Allies were in possession of the heights and could consequently claim to have won the day. The British losses were about 3,000 killed and wounded, largely incurred during the struggle for the redoubt. The French had about 1,400 and the Russians perhaps 6,000 killed or wounded. See The Invasion of the Crimea, A. W. Kinglake, 1863-87.

Alma Ata. Capital of Kazakh S.S.R., situated at the foot of the N. slopes of the Ala-tau mts. It is a university city, a commercial centre, and an important station on the Turkestan-Siberia rly. Pop. 230,528.



Alma. Battle of Sept. 20, 1854, when British and French troops attacked and defeated the Russians, who held the heights above the river, to bar the advance on Sevastopol. The mouth of the Alma is seen on the right



Alma. The charge of the British Guards on the heights above the river, a critical moment in this Crimean battle. After a painting by J. Huard based on a sketch made on the spot by an English officer. See page 322

Almack's. Name of a Whig gaming club in Pall Mall, and of assembly rooms in King Street, St. James's, London, W. The original Almack's Club was founded in 1764, and was formed by William Almack or McCall (d. 1781), sometime valet to the 7th duke of Hamilton, and keeper of the Thatched House tavern in St. James's Street. Later known as Goosetree's and then as Brooke's, it removed in 1778 to No. 60, St. James's Street. The present Almack's Club is at 3, Savile Row, W.1; it was founded in 1903 at 20, Berkeley Street, as a social club. Almack's Assembly Rooms, built in King Street for Almack by R. Mylne, were opened Feb. 20, 1765. The subscription of 10 gs. provided a ball and supper once a week for twelve weeks. The rooms quickly became an exclusive centre of fashion, and so remained until about 1863. The balls were controlled by a committee of titled ladies, among whom, early in the 19th century, Lady Jersey was prominent. The rooms were later known as Willis's Rooms, and then for a time as Willis's Restaurant.

Alma-Dagh. Mt. range on the N.W. border of Syria. The ancient Amanus, and known also as the Akma and Ekma Dagh, it extends from near Alexandretta in a N.E. direction about 160 m.

Almaden. Town of Spain, in Ciudad Real prov. It received its name (Arab. word for "the mine") from the deposits of quicksilver ore mined there for

many centuries, largely by convicts. About 270 years ago Juan Bustamente invented a process for the recovery of quicksilver long known as the Almaden process. In the autumn of 1938, Nationalist troops of the Estremadura front captured the town and mine, after a long defence by Republican government forces. Pop. 10,000.

Almagest (Arab. *a'*, the; Gr. *megistē*, greatest). Name given by the Arabs to Ptolemy's great work on astronomy. It was written about A.D. 140 and translated into Arabic about A.D. 800. This comprehensive treatise covered the whole subject of astronomy, treated from the geocentric standpoint, and its authority was unchallenged until the 16th century, when Copernicus put forward his heliocentric theory. It included a catalogue of stars, which was a revision of the older catalogue of

Hipparchus; this catalogue contained 48 constellations out of the 88 now generally recognized, and classified the stars by magnitudes.

Almagro, Diego d' (c. 1473-1538). Spanish leader in the conquest of S. America. Born at Áldea del Rey, New Castile, he was associated with Pizarro in the conquest of Peru, but quarrelled with him on the question of the division of territory. A battle took place between their adherents near Cuzco in 1538, in which Almagro's army was defeated, and he was strangled in prison by Pizarro's order.

Alma Mater. Latin for kind mother. The phrase is often used for the university or college where a man or woman has been educated, and for which he or she retains a kindly affection. As the natural mother nourishes the child, so the college, the intellectual mother, nourishes the student.



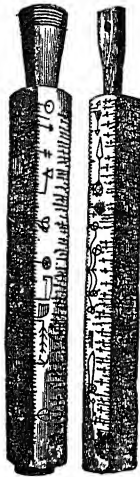
Almack's. Ball at the famous London assembly rooms in King Street, St. James's, in 1798. The assembly rooms formed for many years a place notable for its exclusive social gatherings

Al-Mamun OR **ABDALLAH** (c.786-833). The seventh caliph of Bagdad. The second son of the caliph Haroun-al-Raschid, he was proclaimed caliph in 813, after serving as governor of Khorassan. A patron of letters and science, he made Bagdad a seat of learning, and died near Tarsus in Asia Minor.

Almanac. Year-book or table indicating the days of the week according to the months, together with astronomical, meteorological, and other data of value. The word almanac, thought to be of Spanish-Arabic origin, was used by Roger Bacon in his *Opus Majus* in 1268 and by Chaucer in *On the Use of the Astro-labe* in 1391. Sometimes called Ephemerides or Prognostications, the early printed almanacs were concerned with predictions, and among such were those of Leonard Digges, William Lilly, John Partridge, satirised by Swift, and Francis Moore. In Great Britain from 1710-1834 they were subject to a stamp duty.

Modern almanacs date from the starting by Charles Knight of *The British Almanac and Companion* in 1828, and the best contain a vast amount of miscellaneous information. The most noteworthy existing almanacs include *The Nautical Almanac*, Whitaker's, Hazell's, Oliver and Boyd's, Thom's *Irish Almanac*, *The Almanac y Miloedd*, *Almanach de Gotha*, *Almanach Hachette*, *Connaissance de Temps*, *Berliner Astronomisches Jahrbuch*, and the *American Ephemeris and Nautical Almanac*. The prophetic almanacs survive in Old Moore's, Zadkiel's, and Raphael's.

Clog or log almanacs were oblong sticks of wood, brass, bone, or horn, with notches for the days of three months of the year on each of the four edges. They were flanked left and right with symbols indicating the lunar cycle, saints' days, etc., and made to hang on wall or mantelpiece or carry in the pocket. Supposedly of Scandinavian origin, they were still in use in the N. of England when, in 1886, Dr. Plot described them in his *Natural History of Staffordshire*.



Almanac,
old clog forms

Almanach de Gotha. International book of reference issued in French and German. Established in 1763, it is published by the firm of Justus Perthes at Gotha, hence the name. It is in two main divisions, the first being devoted to the royal and noble families of Europe, while the second resembles *The Statesman's Year-Book*. In the first part the great families of Europe are divided into three classes: (1) reigning houses; (2) houses of Germany, formerly princes of the Holy Roman Empire; (3) other princely and ducal houses, including "the ducal houses of France, Belgium, Great Britain and Ireland, and many of the princely houses of Spain, Italy, and Russia." The second part contains statistics and names of the chief officials of all the countries of the world arranged in alphabetical order. In the John Rylands library, Manchester, there is a complete set of the German edition of the *Almanach* from 1764. It includes two copies for 1808, one suppressed by Napoleon and the other revised according to his directions. In 1945 the *Almanach* failed to appear for the first time for 181 years.

Almandine. Deep-red variety of the garnet, often having a violet tinge. Formerly known as the carbuncle, it is now called the precious or noble garnet. Good almandines closely resemble rubies, but are less hard, have a higher specific gravity (4.1 to 4.3), exhibit single refraction and no dichroism, and show the same colour in whatever light they are viewed. Almandine and zircon are the only precious stones exhibiting dark absorption bands in the spectrum. With almandine the dark bands appear in the green part, a phenomenon which can be observed by the help of a pocket spectroscope. Almandine spinels are red spinels with a blue or violet hue. These stones are found chiefly in Ceylon, Brazil, Tirol, the U.S.A., and Greenland. The word comes from Alabanda, a city of Caria in Asia Minor. See Garnet.

Almansa OR **ALMANZA.** Town of Spain, in Albacete province. It is 60 m. N.W. of Alicante by rly. from that town to Madrid, and has a ruined Moorish castle and an obelisk marking the site of the battle of 1707. Pop. 11,250.

Almansa, BATTLE OF. Fought April 25, 1707, between the English on one side and the French and Spaniards on the other. England was struggling against France, her object being to place

the Archduke Charles, instead of a French prince, on the throne of Spain. To assist him an army was sent to Spain, and the rival armies met at Almansa. The English and their friends were under a Frenchman, Ruvigny, whose English title was earl of Galway; the French and Spaniards were under the duke of Berwick. Ruvigny had with him about 15,000 men, of whom only a third were British, the rest being Portuguese, German, and Dutch; Berwick had about 25,000.

Berwick took up a position on some rising ground, with infantry in the centre and cavalry on the wings, and Galway, after a march of eight miles, came up to attack him. This first charge was successful, and the English regiments, horse and foot, drove the Spaniards from the field; but the French meanwhile attacked their right and soon overwhelmed the Portuguese battalions. Then the victors turned against the English, Dutch, and Germans, who, although outnumbered, fought desperately. Their position, however, proved hopeless, and after a time Galway managed to withdraw most of his men and save his guns. The British and their allies had about 4,000 killed and wounded, and lost 3,000 prisoners.

Almansur (c. 710-75). Sur-name, meaning the Victorious, of the second Abbasside caliph Abu Ja'far, the founder of Bagdad. He succeeded his brother Abul Abbas in 754, and his reign was marked by the loss of Spain and Africa and by the oppression of Christians in Syria and Egypt. For security against attack he left his old residence near Kufa and built (763-6) a new capital on the site of the old town of Bagdad. He died while on pilgrimage to Mecca.

Almas, MOUNT. Commanding height in Transylvania, near the Bekaz Pass. It was occupied by the Russians, Nov. 11, 1916, in their invasion of Transylvania to aid the Rumanians.

Alma-Tadema, SIR LAURENCE (1836-1912). Anglo-Dutch painter. Born at Dronrijp, Friesland, Jan. 8, 1836, he studied at the Antwerp Academy, then under the direction of Baron Wappers. Success attended him from the first.

In 1863 the Grosvenor Gallery organized a representative exhibition



Sir Laurence Alma-Tadema, painter
R. Haines

of his work, in 1870 he made his home in England, and in 1873 he was naturalised. Elected A.R.A. in 1873 and R.A. in 1879, he was knighted in 1899, and received the Order of Merit in 1905. He died at Wiesbaden, June 25, 1912.

Alma-Tadema devoted special study to the life and customs of the Greeks and Romans, and his most popular pictures recreated the period with great care for accuracy of detail, e.g. *The Roses of Heliogabalus*, 1888, one of his largest canvases; *The Colosseum*, 1896; and *The Conversion of Paula*, 1898.

Almeh OR **ALMAH** (Arab. *alama*, to know). Name given in Egypt to a member of a superior class of

professional women musicians, in allusion to the fact that they have spent years in rigorous training and know their duties. Almehs are usually singers only, but sometimes are instrumentalists. Other forms of the name are *alme* and *alma*, the strict plural form being *awalim*.

Almeida. Town of Portugal, in Guarda district. It stands on the river Coa, near the Spanish frontier, and was taken by the Spaniards in 1762 and the French in 1810. The fortifications, destroyed by the French in 1811, were restored by the British.

Almeida, DOM FRANCISCO D' (c. 1450-1510). Portuguese seaman. After serving against the Moors, he was appointed in 1505 the first viceroy of Portuguese India. He founded new trading posts in Cochín, Ceylon, and Sumatra. To avenge the death of his son Lorenzo, killed in a conflict with the Egyptians, Almeida burned and looted Goa and other ports, and in Feb., 1509, annihilated the Egyptian fleet off Diu. Superseded by Albuquerque, he sailed for Portugal, but was killed by savages, March 1, 1510, on the site of the modern Cape Town.

Almeida-Garrett, JOÃO BAPTISTA DA SILVA LEITÃO, VISCOUNT DE (1799-1854). Portuguese dramatist and statesman. Born at Oporto, he was educated at the university of Coimbra. His attach-



Alma-Tadema. A Silent Greeting, typical of the classical subjects chosen by this painter
Tate Gallery, Millbank

ment to Liberal principles forced him to spend some years in exile, but in 1832, under a new king, he was appointed minister of the interior. He carried through many reforms in the Cortes, represented his country at Brussels, and for some months was minister for foreign affairs. He contributed to the foundation of a national theatre and wrote a series of prose dramas, the most important of which are *Auto de Gil-Vicente*, 1838; *D. Filippa de Vilhena*, 1840; and *Frei Luiz de Sousa*, 1843. He died Dec. 9, 1854.

Almeria. Prov. of S.E. Spain. Formerly part of Granada, it has an area of 3,360 sq. m., is well watered, rich in minerals, especially lead and sulphur, yields wine, olives, and fruit, especially white grapes, and is celebrated for its cattle. Pop. 368,292.

Almeria. City and seaport of Spain. The capital of Almeria province and one of the chief Mediterranean ports, it is 60 m. S.E. of Granada, on the rly. to Madrid, and has a wireless station. Beautifully situated on the Gulf of Almeria, which extends from Cabo de Gata to Punta de Elena, the city is a winter health resort, with a fine harbour, a four-towered Moorish castle, and a late Gothic cathedral. It exports the noted Almeria white grapes and other fruits, esparto, and iron ore. Founded by the Phoenicians, it was

finally taken from the Moors in 1489. Pop. 84,901.

During the greater part of the Spanish civil war, 1936-39, Almeria was held by Government forces. When the British government protested in July, 1938, against the bombing of British ships in Spanish harbours by Nationalist planes, Gen. Franco proposed that the port of Almeria be kept for non-military traffic. This suggestion was rejected.

Almirante. Seaport on the N. coast of Panama. It stands on Almirante Bay, an arm of the Chiriquí lagoon, about 40 m. E. of the Costa Rica boundary. It is the terminus of a rly. from Port Limón in Costa Rica. Bananas and other fruit are exported.

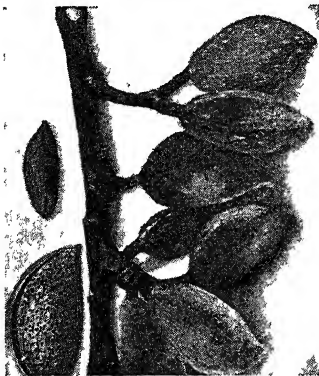
Almissa (Slav. *Omish*). Seaport of Yugoslavia. On the Adriatic, at the mouth of the Cetina, and 14 m. S.E. of Split, it formed part of the former diminutive republic Poglizza. Wine is produced.

Almohades. Mahomedan sect and dynasty of the 12th and 13th centuries. Its founder was Mohammed ibn Tumart, a Berber by race and an ascetic, who preached a stricter form of the Mahomedan faith. He died in 1123, but his disciple Abd-el-Mumin, a redoubtable warrior who assumed the title of a caliph, conquered a considerable part of N. Africa and in 1149 made himself ruler of Morocco. Later he subdued part of Spain, making Seville his capital. The great blow to the power of the Almohades came in 1212, when Mahomed III was defeated by the Christian kings of Spain. Their possessions in Spain were quickly lost, and soon afterwards those in Africa. Their last representative, Idris IV, was murdered in 1269. The name is a corruption of Arabic *al-muwahhid*, one who declares the unity of God. See Spain: History.

Almon, JOHN (1737-1805). English writer and bookseller, friend of John Wilkes (q.v.). Born in Liverpool, he became a working printer in London, and a writer of political pamphlets. In 1774 he began to issue *The Parliamentary Register*, from his Piccadilly bookshop. In 1784 he became the owner and editor of *The General Advertiser*. In 1786 he was tried for libel, and afterwards, being in financial difficulties, retired for a time to France. He died at Boxmoor, Herts, Dec. 12, 1805.

Almond (Gr. *amygdalē*). Fruit of *Prunus amygdalus*, a small tree of the family Rosaceae, and a native of the Mediterranean

region. It is largely cultivated in S. Europe and the Levant on account of its fruit, and in cooler parts for the sake of its flowers, which appear in advance of the leaves. Closely related to the peach, the fruit of the almond tree lacks the succulent flesh of the former, and the seed (the almond of commerce) is the only edible portion. The fruit consists of a downy leathery husk, which splits when the seed is ripe and exposes the hard, wrinkled stone enclosing the seed. The different kinds sold in the shops—the sweet, the bitter, and the thin-shelled Jordan—are cultivated varieties of the same species. It was introduced into Britain about the middle of the 16th century, and is cultivated as a beautiful spring-flowering tree or shrub, varying from 3 ft. to 12 ft. in height. The flowers are white,



Almond. The fruit of the Jordan almond as it grows; and (on the left) a nut without the leathery husk, and a kernel

pink, and red. The almond flourishes in ordinary garden soil and in open shrubberies and town gardens. It is pruned in winter by removing old branches.

Almond. River of Perthshire, Scotland. It flows 30 m. S.E. to join the Tay some 2 m. above Perth.

Almond Oil. Oil obtained from the seeds of the two varieties of bitter and sweet almonds. These yield a bland sweet oil by expression, and in addition bitter almonds yield on distillation a volatile or essential oil with a distinctive flavour.

To obtain the expressed oil the reddish-brown powder adhering to their surfaces is cleaned from the almonds, which are then ground or well bruised in a mortar or mill, enclosed in canvas bags, and subjected to pressure between polished steel plates which have previously been warmed. The oil which drips

from the bags is at first turbid, but by rest and filtration a clear straw-coloured oil is obtained, free from odour and with a slight nutty taste. The oil is extensively used in medicine. Sweet almonds yield 40 to 54 p.c. of oil, bitter almonds 38 to 45 p.c.

It thus appears more advantageous to employ the sweet almonds for yielding oil, but as the expressed oil has to be removed from bitter almonds before the essential oil is distilled from them, it is usual to submit a mixture of the two kinds of almonds to pressure and then distil the residue for the sake of the essential oil contained in the bitter almonds. The last-named oil is present in bitter almonds to the extent of $\frac{1}{2}$ p.c. The oil as distilled contains a small proportion of hydrocyanic acid, and, being largely used as a flavouring in cookery and confectionery, it is submitted to a process which frees it from this poisonous constituent, usually by redistilling with a mixture of lime and iron sulphate.

Peach kernels are also used for obtaining essential oil of almonds, the product being similar to that yielded by bitter almonds. Nitrobenzene, introduced as a substitute for essential oil of almonds, is used for perfuming soap. It can be distinguished from the natural oil by adding twice its volume of caustic potash; if nitrobenzene is present the mixture turns green.

Almoner (Gr. *eleemosynē*, alms). Official alms-giver. Originally the title of the member of a monastery appointed to dispense the alms, the term came to be applied to a similar functionary in the household of princes and ecclesiastics. The grand almoner of France was a high court official.

The British royal household has an almonry, comprising the hereditary grand almoner, the marquess of Exeter, the lord high almoner, and the sub-almoner. The lord high almoner dispenses the royal alms on Maundy Thursday. At a coronation the hereditary grand almoner scatters the royal largesse in Westminster Abbey while the peers pay homage to the sovereign. The chaplain of a benevolent institution is sometimes designated the almoner, and many hospitals employ almoners, whose duties include the determination of the fees that a patient can be expected to pay for admittance.

Almora. Town and district of India. The town is the capital of the Kumaon division of the United

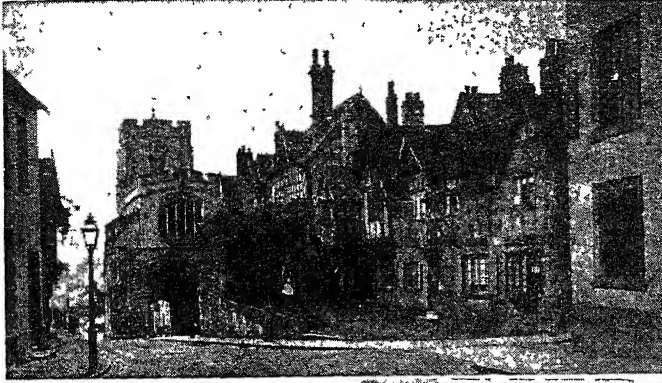
Provinces and lies 83 m. N. of Bareilly, on a ridge in the Almora hills, 5,494 ft. high. For centuries a native stronghold, it came into British possession in 1815. The district, 5,420 sq. m. in area, produces tea.

Almoravides. Mahomedan sect and dynasty of the 11th and 12th centuries. Converted to Mahomedanism and fired with its religious zeal, a tribe from the Sahara made war successfully upon its neighbours and in the 11th century conquered Morocco. They called themselves the Murabitis or hermits, a name altered in the course of time to Almoravides. Abu Bekr was their early leader, but it was under his kinsman, Yusuf-ibn-Tashfin, that they attained the height of their power. He founded the city of Marrakesh, Morocco, and in 1086 crossed over to Spain and there brought the various Moorish kingdoms under his authority. When he died in 1107, his empire included all Spain and Portugal from the Ebro to the Tagus, considerable territory in N. Africa, and the Balearic Islands. Under his successors much of the European possessions passed to the Almohades, by whom their power in Marrakesh was destroyed. The city of Marrakesh was lost in 1147, a date marking the end of the Almoravides. See Morocco.

Almqvist, KARL JONAS LUDWIG (1793-1866). A Swedish author. Born at Stockholm, at the age of twenty he left a post in the civil service to found a cooperative farm colony, which proved unsuccessful. He took to teaching and to the composition of textbooks, turned author, and achieved fame as a writer of romance. In 1851 he was charged with forgery and murder, and fled to America. Returning to Europe in 1865, he lived under the name of C. Westermann at Bremen, where he died Sept. 26, 1866. His best known work is the group of novels called *The Book of the Thorn-Rose*, 1832-5.

Alms-houses. Homes provided in England by individual philanthropists, city companies and trades for the aged poor. Usually they consist of separate tenements. When on the dissolution of the monasteries the almonies of these institutions disappeared, the foundation of alms-houses became a common form of benevolence, generally under the name of hospitals, a term still used for them in Scotland.

London has many alms-houses, notably the Charterhouse, founded in 1611. Near Winchester is the Hospital of S. Cross, founded



in 1132; at Warwick is the Leicester Hospital, dating from 1571, and at Hereford the Coningsby Hospital, founded 1610. In the U.S.A. the term almshouse is used for buildings similar to the English workhouse, and in many cases connected with farms on which work is found for able-bodied paupers. See Charities of London, Sampson Low, 1850; The Almshouse, A. Johnson, N. Y., 1911.

Almucantar OR **ALMACANTAR** (Arab, sundial). Circles of the celestial sphere. They are parallel to the horizontal plane and cut the meridian at equal distances. They are, therefore, parallels of altitude, and comprise all points of the same altitude. The horizon is the first almucantar. S. Chandler, in 1880, adopted the name for his instrument for determining time and latitude.

Alness, ROBERT MUNRO, 1ST BARON (b. 1868). British lawyer and politician. Born May 28, 1868, he was educated at Edinburgh university. Serving as Liberal M.P. for Wick Burghs, 1910-18, and

for Roxburgh and Selkirk, 1918-22, he became lord advocate, 1913, secretary for Scotland, 1916, and lord justice-clerk, 1922, taking the title Lord Alness, 1922.

Alnwick. Urban district, market town, and the county town of Northumberland, England. On the Aln, 34 m. by rly. N. of Newcastle-upon-Tyne, it has a brewery and a large trade in corn, cattle, and fishing tackle. A fortified town

at an early date, it was frequently besieged by the Scots, e.g. in 1093, when Malcolm, king of the Scots, was killed, and in 1172, when William the Lion was taken prisoner. It retains vestiges of its old walls and one gate, the Bondgate, and has an old church, S. Mary and S. Michael, and S. Leonard's hospital. Market day, Mon. Pop. 7,250. *Pron.* an'-ick.

Alnwick Castle. Seat of the duke of Northumberland, just outside the town of Alnwick, utilised since 1945 as a teachers'

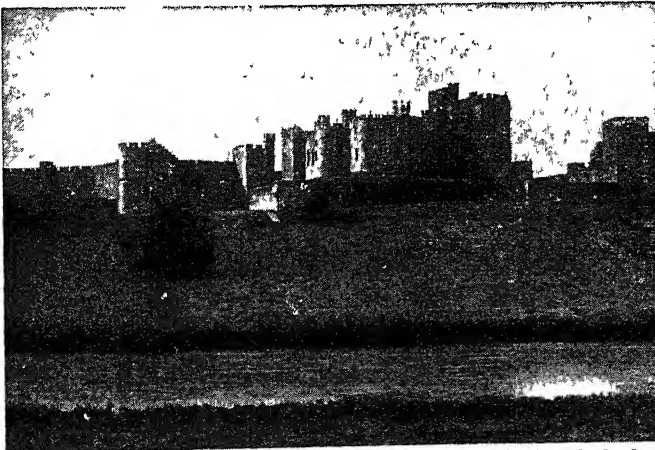


Almshouses. Part of the beautiful Hospital of S. Cross, near Winchester, showing to the right, Cardinal Beaufort's Tower; above, the fine Tudor timbered buildings of Lord Leicester's Hospital at Warwick

Photochrom

training college. It was first built in the 12th century and passed to the Percy family early in the 14th. Of the old castle little remains save a gateway and a Norman arch; the building was restored in the 18th century and added to in the 19th. It contains many fine works of art and is surrounded by a park with ruins of two abbeys and two memorial towers.

Alodial OR **ALLODIAL** (Lat. *allodium*). The name given to a form of land tenure found in England in Anglo-Saxon times and common in Scandinavia. The word *alod* means probably an inheritance, and appears in the English records of the 11th century. Alodial land is practically the same as freehold and opposed to feudal. A man who held land on feudal tenure was obliged to render service for it to the king or other overlord; one whose land was alodial had no such obligation. About the time of the Norman Conquest, as landholders found it necessary to put themselves for protection under overlords, alodial tenure disappeared rapidly, and for centuries it has not been recognised in English law. In Norway and Sweden this tenure, called *odol*, was common in the Middle Ages, and such land could not be alienated. See Land and Land Laws.



Alnwick Castle, Northumberland, seat of the Duke of Northumberland. Though the greater part of the edifice is comparatively modern, there are some remains of the original Norman structure

A.L.O.E. A Lady of England, pseudonym of Charlotte Maria Tucker (*q.v.*), writer of books for children.

Aloe. Extensive genus of the family Liliaceae. It consists of succulent shrubs (rarely trees) with thick, fleshy leaves margined with prickles or teeth. The numerous tubular flowers are sex-partite and arranged in erect racemes. They are plants of hot, dry countries, particularly of S. Africa, their organization being adapted to growth under such conditions, the leathery texture of the skin hindering rapid evaporation of moisture from the leaves. Several species of the plant are of economic importance, the drug aloes being the dried resinous juice from the leaves of *Aloe vera* and *Aloe Socotrina*, that from the former being known as Barbados aloes and the latter as Socotrine aloes.

Aloes. Juice of various species of the aloe, evaporated to dryness. It occurs in commerce in masses of a yellowish-brown colour. The most important constituent is a crystalline principle called aloin. Combined with nux vomica and ferrous sulphate, aloes is often useful in simple anaemia. It is an excellent intestinal purgative in cases of chronic constipation, and is most frequently administered in the form of a pill. Aloes is contained in the compound rhubarb pill, the compound colocynth pill, and the compound pill of colocynth and hyoscyamus.

Aloes Wood, EAGLE WOOD, OR LIGN ALOES. Supposed to be the *agallochum* of the ancients, it is obtained from a large tree, *Aquilaria agallocha*, a native of Sylhet. This yields an abundance of resin and uggur oil, the latter esteemed as a perfume and burnt in Eastern temples to scent the air. The oil is also used in gout and rheumatic affections. There is a Biblical reference to "trees of lign aloes which the Lord hath planted," in Num. xxiv, 6. This version of the name is from the Lat. *lignum*, wood.

Alone in London. Melodrama by Robert Buchanan and Harriet Jay. Produced Nov. 2, 1885, at The Olympic Theatre, London, it had a run of 107 performances.

Along OR HALONG. Bay of the Gulf of Tongking, French Indo-China. It is sheltered by Cao-Ba Island on the S.W.

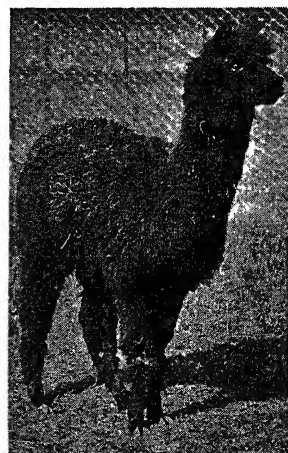
Alopecia. Medical term for baldness (*q.v.*).

Alost (Flem. *Aalst*). Town of Belgium, in E. Flanders. It stands on the navigable Dender, 19 m. by



Alost. The 13th century Hôtel de Ville of the old Flemish town

ry. W.N.W. of Brussels, and has a magnificent, but unfinished, church, S. Martin's, a 13th century town hall, and a Jesuit college. It has bleaching works and manufactures textiles, leather, beer, and spirits. After heavy fighting at the outset of the First Great War, Alost was occupied by the Germans from Oct., 1914, to Nov., 1918. It was again occupied



Alpaca. South American animal of the camel family, the hair of which is used for making a material of the same name

Gambier Bolton, F Z.S.

by them in their drive W. from Brussels, May, 1940, remaining so until liberated by the British 2nd army, Sept. 4, 1944. Pop. 41,151.

Aloysius (1568-91). Italian saint. Luigi Gonzaga was the son of Ferdinand, marquis of Castiglione, and was born March 9, 1568. Conspicuously devout from earliest boyhood, he resigned his title in 1585, joined the Society of Jesus, taking the name of Aloysius, and died while ministering to the sick during a plague epidemic in Rome, June 21, 1591. He was beatified by Gregory XV in 1621, and canonised by Benedict XIII in 1726. He is a patron saint of schoolboys.

Alpaca. Domesticated breed of the guanaco, a South American animal of the camel family. In its wild state it is found in flocks, ranging from 100 to 500 head, among the mts. of Peru and Ecuador, and as far S. as Tierra del Fuego. Domesticated by the Peruvians in early days, it is bred for its fine, long wool, from which blankets and cloaks (*ponchos*) have been made from time immemorial. These herds feed on the higher lands of Bolivia and S. Peru, and are brought down in the shearing season.

The British trade in alpaca wool dates from 1836, and owes its development to Sir Titus Salt, who manufactured the wool into cloth in his mills at Bradford. The 13th earl of Derby had a herd of alpacas at Knowsley, and hoped to acclimatise the animal for commercial purposes, but was disappointed.

The name is a compound of Arab *al*, the, and *paco*, the Peruvian name of the animal.

The hair of the alpaca is some 7 ins. to 15 ins. in length, brown, grey, and black in colour, with a small proportion of white. The material, originally used as a substitute for mohair, which it resembles, is soft to the touch and of fair lustre. Alpaca goods are usually dyed black. Alpaca dress goods and linings are made with a cotton warp and an alpaca weft.

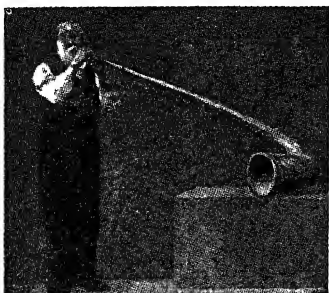
The best market quality of raw alpaca is that known as Arequipa fleece. Cheaper sorts come from Tacna, Callao, and Chala, Peru.

Alp-Arslan (c. 1029-72). Sur-name, meaning brave lion, of Mohammed ben Daud, second Seljuk sultan of Persia, and nephew of Toghrul Beg. He became ruler of Khorassan in 1059 and sultan of Persia in 1063, and extended his dominions by the invasion of Armenia and Asia Minor. In 1071 he captured the

Greek emperor, Romanus Diogenes, and extracted a large ransom from him, but, invading Turkistan the following year, he was mortally stabbed by a captured chief. His favourite residence was Merv, where he was buried.

Alpena. Chief city of Alpena county, Michigan, U.S.A. It stands on Thunder Bay, a branch of Lake Huron, and is a port with a good harbour, a pleasure resort, and a manufacturing place. Water power is obtained from the river, minerals are found in the neighbourhood, and fishing is carried on. Alpena, first settled in 1835, became a city in 1871. Pop. 12,706.

Alpenhorn OR ALPHORN. The long, curved, wooden bugle used by the Swiss peasants and cow-



Alpenhorn. Instrument used by the Swiss peasants and cowherds

herds to communicate with each other from a distance. It has a conical bore with a mouthpiece of cup shape. Some of these horns are as much as 8 ft. long, but their size, shape, and curvature differ with the locality.

Alpenstock. A long ash pole with a spike at the end used in mountaineering. It has been partly superseded by the ice-axe.



Alpenstock. Mountaineer, with alpenstock, seen during an ascent

Alpes-Maritimes. Frontier department of S.E. France. It is bounded N. and E. by Italy. S.E. by the Mediterranean, and has an area of 1,443 sq. m. Spurs of the Maritime Alps extend to the sea, where the littoral is called the French Riviera. It contains the health resorts of Nice, the capital. Mentone, Cannes, and Antibes, and surrounds Monaco. The mildness of its climate is world-renowned, though in the highlands the cold is extreme. The valleys are beautiful and fertile. It produces wine, oil, tobacco, silk, honey, wax, fruit, and flowers. Perfumery

is made, while there are sardine and anchovy fisheries, and minerals are worked. The department is divided into three arrondissements. Pop. 513,714.

Alpha and Omega. First and last letters of the Greek alphabet. In Rev. 1, 21 and 22 (compare Is. 41 and 44) they symbolise the eternity and perfection of the Deity. Combined with the cross or the monogram of Christ, they were inscribed on tombs of early Christians. The Hebrews used Aleph and Tau, first and last letters of their alphabet, for absolute completeness and perfection

ALPHABET: ITS ORIGIN AND GROWTH

M. A. Canney, Professor of Semitic Languages

This article gives some account of the long and varied history of the alphabet, each English letter of which is, in addition, described separately. See also Writing, Printing, etc., while the articles on Language, Philology, and Hieroglyphics should also be consulted

The word alphabet is formed from *alpha* and *bēta*, the names of the first two letters of the Greek system. It thus indicates the origin of English letters, which is identical with that of the Latin, Coptic, Russian, and other alphabets of modern Europe.

The remarkable variety of alphabets is not confined to the formation of letters, but extends, though in less degree, to the number of letters employed. In the latter case the difference is due to a different development, through climatic or other causes, of the organs of speech. There are distinctions of sound in Arabic, for instance, which it is impossible for most Europeans to reproduce, and these are represented by different letters. Accordingly, certain letters in Hebrew may correspond to two letters or sounds in Arabic. We find, for example, that to suit their alphabets to the sound of their language, while the Hebrews and the Italians use twenty-two letters and the English twenty-six, Arabic employs twenty-eight and Russian thirty-three.

Of other European alphabets, Polish contains 45 letters; French, 25; German, 26; Danish and Norwegian, 27; Spanish, 29; Hungarian, 38; Albanian, 33. The old Maeso-Gothic, in which the translation of the Bible in the 4th century was made by Ulphilas, had 25 letters, and the Runic alphabet characters, early used by the Scandinavian peoples, numbered 24. Among Eastern dialects, Sanskrit, the ancient and literary language of India, which probably came nearest to reproducing the supposed original Indo-European parent language, possessed an

alphabet of 49 letters; Hindustani, 35; Persian, 32; Turkish, 31; Armenian, 38; Ethiopic, 26, with seven additional Amharic letters. Telugu has 35 consonants and 13 vowels, with various combinations; Tibetan, 35; and Japanese, 73.

The above examples of the variation in the number of letters included in the different alphabets, which in many cases are used to express sounds which offer special difficulties to the foreigner, make it easy to understand how unsatisfactory must be any attempt, especially in the case of non-European sounds, adequately to represent the words of a foreign language by means of English characters.

In 1891 Messrs. Gilbert and Rivington printed the Lord's Prayer in 300 languages, comprising the leading languages and their principal dialects throughout the world. Some of the alphabets used are similar, and many more which are known to exist or to have existed are not represented. But this fact gives some indication of the vastness of the field covered by the history of the alphabet and of the wonderful ingenuity with which alphabets have been developed.

Since *alpha* and *bēta* are adaptations of the Semitic names *ʾālf* (Heb. *ʾāleph*) and *βēl* (Heb. *bēth*), the term alphabet seems to carry us back to a Semitic precursor of the Greek system. The square Hebrew characters of the Hebrew Bible are a modified form of Aramaic or Palmyrene characters, and were adopted by the Jews at a comparatively late period in their history. The older Hebrew letters, as seen in the Siloam

Names of English letters	Names of Greek letters	Names of Hebrew letters	Objects when Semitic letters were derived	Egyptian hieroglyphs 3000 B.C.	Egyptian hieroglyphs 2500 B.C.	Egyptian Demotic 400 B.C.	Coptic letters A.D. 400	East Mediterranean pictographs	Cretan and Aegean Linear	Semitic and Cypriote 1100 B.C.	Phoenician 1000 B.C.	Chalcedonian Greek	Classical Greek 600 to 300 B.C.	Greek Uncial A.D. 400	Greek Minuscule	Early Latin 300 B.C.	Classical Roman 50 B.C.	Modern Roman A.D. 1500	Modern case minuscule A.D. 150
Ay	Alpha	Aleph	ox		2	NOT SOUND OF A = 2													a
Bee	Beta	Beth	house		3														b
See	Gamma	Gmel	Camel		4	NOT SOUND OF C													c
Gee																			
Dee	Delta	Daleth	door		5	NOT SOUND OF D = 5													d
Ee	Epsilon	He	window		6	NOT SOUND OF E = 6													e
Ef		Vau	hook		7														f
Zed	Zeta	Zayin	weapons		8	NOT SOUND OF Z													z
Aich	Eta	Cheth	fence		9	NOT SOUND OF H = 9													h
Th	Theta	Theth	serpent		10	NOT SOUND OF Th													
I Jay	Iota	Yod	hand		11														i
Kay	Kappa	Kaph	palm		12														k
EL	Lambda	Lamed	ox goat		13														l
Em	Mu	Mem	waters		14														m
En	Nu	Nun	fish		15														n
Eks.	Xi	Samekh	roast		16	NOT SOUND OF S = 16													x
O	Omicron	Ayin	eye		17														o
Pee	Pi	Pe	Mouth		18														p
	Sau	Tsade	javelot		19	NOT SOUND OF T = 19													
Kue	Kappa	Qof	knot		20														q
Ar	Rho	Resh	head		21														r
Es	Sigma	Shin	teeth		22	NOT SOUND OF S = 22													s
Tee	Tau	Tau	mark		23														t
You	Upsilon				24														u
																			VWvw
Ph	Phi																		
	Chi																		
Wye	Psi																		y
	Omega																		

Table tracing the derivation of our alphabet from that used by the Phoenicians of 1000 B.C., and traditionally attributed to Cadmus. All writing of earlier date was hieroglyphic or pictographic—i.e. writing by means of picture-drawing, hieroglyphs being the sacred characters of the ancient Egyptian language, the signs representing sounds (phonetic) or ideas (ideographic). The Mediterranean peoples, including the Greeks, used various and complex systems of pictographic, ideographic, and phonetic writing. The names of Semitic letters in the above table are examples. The earliest Greek handwriting, like the Semitic, was from right to left; then came a method in which the direction alternated before the left to right form was adopted. Further developments were made by the Romans, who in the 1st century A.D. produced letters which have served, through the intermediary of early Christian scribes, as models for type down to our own time.

The smaller letters, called minuscule, as distinguished from the majuscule or capital, and known to printers as lower-case, are an evolution from the capitals brought about by the rapid movement of the hand in writing and lettering. The Semitic alphabet has no capitals. The line of descent for letters, as for the arts, in Europe is through Greece, but only one of the important modern languages, Russian, has characters based directly upon the Greek; almost all the alphabets of modern civilization being derived from the Roman. The first type was made about A.D. 1500 fashioned on the script model; and the early Black Letter was the origin of German text or Gothic letters. Before the invention of the first alphabet knowledge was transmitted orally, and symbol- or picture-writing was used for the purpose of assisting the memory; it was employed by the Peruvians, and is used at the present time by the North American Indians.

ALPHABET : HOW OUR LETTERS HAVE EVOLVED FROM PICTURE-WRITING

Table adapted from that issued by the Kalkhoff Co., New York

inscription of the 7th century B.C., bear, in some cases, a close resemblance to the so-called Phoenician letters as seen in the Moabite Stone, c. 840 B.C., and to those of the South Semitic scripts, the Sabæan, the Lihyanite, the Tnamidenic, and the Safaitic. There is a like resemblance between these ancient Semitic scripts and the ancient Greek script. The exact relationship of the South Semitic scripts to the so-called Phoenician is doubtful, since some letters differ greatly. Probably they represent "very ancient bifurcations from a script still plastic and not yet reduced to uniformity" (Gardiner).

Phoenician Theory Exploded

In any case, it is no longer possible to regard the Phoenicians as the inventors of the alphabet. Modern discoveries and investigations make it clear that they simply adapted systems that were already in use. The discovery of an ancient pre-Hellenic culture has suggested to some that even the Greek alphabet may not owe much to the Phoenicians. Sir Arthur Evans, as a result of the Minoan discoveries, held that the Phoenician alphabet itself is one of the fruits of Mycenaean culture; that the Cretan and Aegean forms are the more original, and were borrowed by the Phoenicians; that the so-called Semitic names are partly Aegean names and partly translations of Aegean names. This explanation of the names, however, is fantastic.

SEMITIC NAMES OF THE LETTERS. We have authorities for the names of the Greek letters as old as the fifth and fourth centuries B.C., and the names of the Hebrew letters can be carried back to about 700 B.C. The latter seem to rest on an ancient tradition, and there is every reason to suppose that they are as old as the proto-Semitic letters themselves. If some of them are doubtful in meaning and may be artificial formations, most of them are common Semitic words, which may well be taken as good evidence for the proto-Semitic origin of the forms. The usual pronunciation of the Hebrew names probably differs slightly from the original pronunciation. That original pronunciation, as constructed by the great Semitic scholar Nöldeke, to which we add the meanings as known or conjectured, is as follows: 'Alf, ox, Bēl, house. Gaml, camel, Delt, door, Hē, window?, Wau, hook or nail. Zain, weapon?, CHēl, fence?, Tēl, serpent?, Yod, hand,

Kaf, palm of hand, Lamd, ox-goad, Mēm, water, Nun, fish, Samk, prop or post?, 'Ain, eye, Pē, mouth, Sādē, javelin?, Qof, knot?, Rēsh, head, S Hīn, teeth, Tau, mark. The Greek names may be seen in column 2 of the Table of Alphabets on p. 330. It will be noted that the Greeks added several letters. The Semitic names are reminiscent of the origin of writing.

ORIGIN OF WRITING. When primitive folk wish to convey some idea to others otherwise than by speech, the most natural way to do it is to scratch rude drawings or pictures on stone or bark, or some other suitable substance. And we know that this is what the early Bushmen of South Africa, the natives of Easter Island, and other primitive folk did. They conveyed their ideas of objects and actions by means of pictographs. This suggests that the oldest alphabets consisted of pictures, and that when we find pictographs surviving in the alphabets of ancient civilizations, the names of the letters, if they clearly denote things, are primary and not secondary. If the name for B means Box, and B resembles a box, it is more natural to suppose that originally B was a picture of a box than that certain strokes = B were afterwards denominated box because the word for box begins with B, or because the strokes had come to resemble a box. Sir Flinders Petrie, on the other hand, thought that the alphabet originated in signories, such marks as were used by the Egyptian potters, but this suggestion has all anthropological probability against it.

ANCIENT PICTOGRAPHIC SCRIPTS. The origin of the alphabet in pictographs seems to be clearly shown by the literary monuments of Babylonia and Assyria, Crete and Cyprus, Egypt and Sinai, etc.

(a) **Cuneiform Pictographs.** The script of even the oldest (Sumerian) inscriptions of Babylonia represents a stage very remote from that in which each sign represents a picture. The ideograms have already become syllabic. But it is possible to get back beyond the wedge-shaped variety of cuneiform to a linear type, and in some cases to discern in the linear outlines the remains of a picture. Thus, according to Morris Jastrow (*The Civilisation of Babylonia and Assyria*, 1915), the linear form of the sign for sun, day, light, is clearly a derivative of the sun sending forth its rays. In the linear form of the sign for eye, face, seeing, it is not difficult

to see the outlines of an eye. The linear form for the sign for man suggests a man on his back.

(b) **Hittite Hieroglyphs.** The Hittite script has not yet been deciphered, and of it there are several styles of characters. But some of them are pictorial, while others are seen branching off into conventional forms which tend towards becoming linear.

Cretan Pictographs

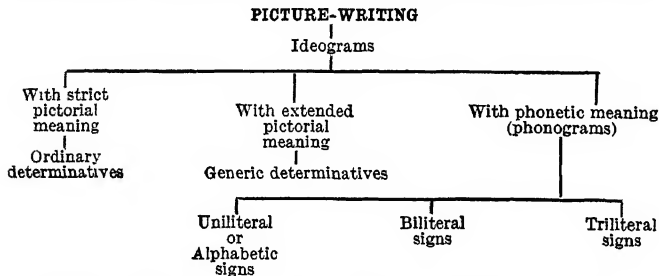
(c) **Aegean and Cypriote Pictographs.** Explorations in Greece and the surrounding archipelago have revealed the existence of an Aegean civilization of great antiquity, and an intercourse between Crete and Greece, Egypt, Syria, and other countries centuries before the maritime activities of the Phoenicians. Many pictographs have been discovered in Crete, as shown by Sir Arthur Evans in his book on Cretan pictographs (1895) and in various articles. At Praesos were found stones inscribed, not only with hieroglyphs and pictures, but also with linear or quasi-alphabetic characters. Some of the symbols found at Cnossos show an approach to the ideographic stage of writing. The forms in the Cypriote syllabary, the script discovered in Cyprus, often show a parallelism with Cretan forms, but seem to be more closely related to those of the Hittite syllabary.

(d) **The Phaestos Disk.** The Phaestos Disk, a disk of terracotta, was found in the excavation of the Cretan palace of Phaestos, and belongs to about 1600 B.C. The inscription, which has not yet been deciphered, is in some form of picture-writing. The script is older than the Phoenician alphabet, and Macalister thinks it may even have been its model. He thinks it not unreasonable to suppose that in process of time the script of the disk would become simplified into just such a linear script as that alphabet.

EGYPTIAN HIEROGLYPHS. The development of pictographic writing is best illustrated by the Egyptian hieroglyphic writing, the nature of which is summarised by Dr. Alan Gardiner as "a combination of rebus-writing with phonetic writing." It starts with picture-signs, or ideograms. Thus the Egyptians, to convey the notion of the ibis-god Thoth depicted an ibis perched on a standard such as was carried in the priestly processions; to indicate the meaning head, they depicted a human head; to indicate house, they drew the ground-plan of a house. Actions could be described in the same way. The image of

a man making a wall is used to indicate the verb to build.

But the pictures in Egyptian hieroglyphics became phonograms as well as ideograms. Thus, for instance, the word used for eye was pronounced *yiret*. A great advance was made when the hieroglyph of the eye was used to spell words which had nothing to do with eye, but the sound of which resembled closely the sound of *yiret*, the word for eye. The principle corresponds to what we know as rebus-writing. If we wished to render *manly* in this way, we might depict a little man and a bed (= lie = ly). A further development of phonograms results in biliteral or trilateral signs, and then in uniliteral or alphabetic signs. Dr. Alan Gardiner, in *The Nature and Development of the Egyptian Hieroglyphic Writing* (*Journal of Egyptian Archaeology*, vol. II, pt. ii, April, 1915), illustrates it by the diagram below.



The final stage here represents what is known as the acrophonic principle. This paved the way for the later Egyptian scripts, the hieratic and demotic. A few bold strokes sufficed to depict the original object, and the letters, as in Chinese, came to bear little resemblance to the things from which they were derived.

SEMITIC PICTOGRAPHS. We have seen already that the names of the Semitic letters, or of some of them, denote common objects. The meanings of seventeen of the letters are more or less certain. If, now, we look at the letters of the Phoenician alphabet in the form in which we find it on the most ancient gems and seals (9th century B.C.) and on the Moabite Stone (c. 840 B.C.), we note that a number of them resemble roughly the things denoted by the names, e.g., particularly, *alf* = head of ox, *bēt* = house, *yod* = hand, *kaf* = bent hand, *mēm* = water, *ain* = eye, *pē* = mouth, *rēsh* = head, *shin* = tooth, *tau* = mark. In some cases the resemblance is even more marked in the South Semitic

scripts (the Sabaeen, Lihiyānite, Thamūdnic, and Safaitic). The obvious inference is that the Semitic alphabet originated and developed in the same way as the Egyptian hieroglyphics.

ORIGIN OF THE PHOENICIAN ALPHABET. The Phoenician alphabet can hardly have come into use on Syrian soil earlier than about 1000 B.C., for the available evidence goes to show that the Babylonian cuneiform script was officially employed throughout Syria for some time after 1400 B.C. Since records in cuneiform, Egyptian hieroglyphics, and possibly in Cretan script date back thousands of years before 1000 B.C., it must have been derived from or modelled upon one of the scripts of the older Mediterranean or Mesopotamian civilizations. Deecke attempted to derive the Phoenician alphabet from the Babylonian cuneiform. De Rougé sought its origin in the cursive Egyptian script known as hieratic.

Prütorius sought it in a syllabary resembling that used later in Cyprus. Sir Arthur Evans seeks it in the Minoan scripts which he has discovered in Crete. Lenormant suggested that the Phoenician alphabet was directly borrowed from the Egyptian hieroglyphs. Dr. Alan Gardiner strongly supports this view of its source, and discusses it in the light of evidence which, he thinks, puts the case for an Egyptian origin on an entirely new footing.

NEW SINAITIC SCRIPT. The fresh evidence is supplied by a new Sinaitic script. In the mining districts of Sinai have been found many hieroglyphic records dating from the First down to the Twentieth Dynasty. Among the monuments discovered in 1905 by the Egypt Exploration Fund under Flinders Petrie were ten with inscriptions in an unknown script. At first the forms seemed to be roughly graven Egyptian hieroglyphs, but some of them were soon observed to be signs which could not be identified with those of any known Egyptian style of

writing. M. Weill had already published a fragment which belongs to the same group. In these monuments the characters run sometimes in vertical columns and sometimes in horizontal lines. Flinders Petrie gives as the date of this writing about 1500 B.C. Now, we find here, on the one hand, signs which seem to have been borrowed from the Egyptian hieroglyphs, and, on the other hand, signs which are foreign to the Egyptian hieroglyphs, but which answer to the names or forms of the Semitic letters.

There are also a number of signs which do not resemble any surviving Semitic forms. But the resemblances to hieroglyphs and known Semitic forms seem to Dr. Alan Gardiner to support the view that not later than 1500 B.C. there existed in Sinai a Semitic alphabet modelled on the Egyptian hieroglyphs. Dr. Gardiner concludes that "the common parent of the Phoenician, the Greek, and the Sabaeen may have been one out of several more or less plastic local varieties of alphabet, all developing on the acrophonic principle under the influence of the Egyptian hieroglyphs."

OTHER SEMITIC AND ORIENTAL ALPHABETS. Closely related to Hebraeo-Phoenician is the language of the Aramaeans, which spread over all Syria and Palestine and even beyond. From the Aramaean script were derived the Hebrew, Syriac, Mongolian, Parsi, Arabic, Pehlevi, Armenian, and Georgian. The Syriac and Arabic scripts are cursive as compared with the Hebrew. Most of the ancient Semitic inscriptions, like most of the ancient Greek inscriptions, are written from right to left. But some of the Semitic inscriptions, like some Greek inscriptions, are written alternately from right to left and left to right. The former method came to prevail for the most part in the Semitic languages. In the case of Greek, the latter method obtained a complete victory. All the modern Indian scripts which are descended from the Devanagari characters are of Semitic origin, if Dr. G. Bühler is right in tracing back these characters to an ancient alphabet of North Semitic type.

GREEK AND OTHER ALPHABETS. The Greek alphabet was derived from the Phoenician, but from a form of it which is earlier than that of the most ancient gems and the Moabite Stone. Some of the forms, e.g. those for Greek λ and α, resemble the Sabaeen more

than the Phoenician. Of course, the Greeks remodelled the Phoenician letters. They gave certain consonants a different value, even converting some of them into vowels, and they added more consonants. For instance, they had no use for some of the peculiar guttural sounds in Semitic. Semitic Alf is not really equivalent to A. The sound is best represented by a soft breathing. It is really 'Alf, the *a* sound facilitating the pronunciation. 'Ain, again, may best be represented by a hard breathing. It seems to have sounded to the Greeks *au*, whence the value *o* which they gave it. Ignoring the initial guttural sounds of Hē and CHēt, they converted the letters into *ε* and *η*. The Greek alphabet thus remodelled was passed on to the Etruscans, the Romans, the Copts, and the Russians.

LATIN AND OTHER ALPHABETS. The Latin alphabet is derived from the Chalcidian form of the Greek, the form used at Chalcis in Euboea, an island of the Aegean. It was taken to southern Italy by Greek colonists about the 8th century B.C. The Irish script, usually called the Irish uncial or semi-uncial, seems to have been introduced by S. Patrick from the south of France some time in the 5th century. It was evolved from the local 5th century cursive, whereas the Roman uncial was derived in the main from the capitals.

THE ENGLISH ALPHABET. The English alphabet can be traced back for about twenty-three centuries to its home in central Italy. It is a member of the Latin family of alphabets, and English printed letters are still called Roman type. They resemble the Latin forms used by the Italian printers of the 15th century, which in their turn were imitations of the forms used in the minuscule MSS. of the 10th and 11th centuries. These minuscule letters were so called from their small size. They are cursive forms of the larger and earlier uncial letters, which again were derived from the Roman letters, of the Augustan age. These Roman letters correspond loosely to the capital letters now used by printers. The well-known inscriptions of the Scipios relate the letters closely to those employed in the 3rd century B.C.; and these again do not differ much from forms used, probably towards the end of the 5th century B.C., in the earliest existing specimens of Latin writing.

Naturally the Latin letters had to be adapted to some extent to suit English sounds. The Latin I was converted into I and J, the

Latin VV or UV into U=W. In Phoenician and Hebrew *y* is the tenth letter and *z* the seventh. The position of Y and Z at the end of the English alphabet seems to be due to the fact that they were a late introduction into the Latin alphabet from the Greek, and were used only in Greek loan-words. It has been pointed out that Q and X were not of much service to the Romans, and are of equally small service in English. Almost equally useless is the letter C in the English alphabet as an addition to K. The English alphabet is therefore capable of simplification. The Anglo Saxon, which is thought to be partly Roman and partly Irish in origin, adopted from the Runic two signs for W and TH, at one time included in the English alphabet.

Bibliography. The Alphabet, Isaac Taylor, 1883; Comparative Grammar of Semitic, W. Wright, 1890; Story of the Alphabet, Edward Clodd, 1913; The Formation of the Alphabet, Sir W. Flinders Petrie, 1912; The Loom of Language, ed. L. Hogben, 1944; and the various works referred to in this article. See also the articles on the different letters of the alphabet.

Alpha Centauri. Double star, both of whose components are stars of the first magnitude. It is one of the nearest stars to the solar system. The masses of the two stars composing it are very nearly equal, and one of them appears to be in size and composition a close counterpart of our own sun. See Stars.

Alpha Crucis. Brightest star of the Southern Cross. It is a triple star, but while two of its components are between the first and second magnitudes, the third is only of the sixth magnitude. The two brighter stars are very nearly matched.

Alpha Cygni. One of the 20 brightest stars in the sky and probably one of the four brightest stars in our stellar universe. Its distance is so great that it cannot be measured directly but is inferred from its spectrum to be about 500 light years.

Alpha Particles (OR RAYS). Particles emitted spontaneously by radio-active elements. They are ionised helium atoms. Lord Rutherford (*q.v.*), by bombarding certain light elements with alpha particles, was able to break up the atomic nuclei. See Atom; Beta Rays; Gamma Rays.

Alphege OR ALPHAGE (954-1012). An English archbishop, saint, and martyr. After having been a monk at Deerhurst and also an anchorite and abbot at Bath, he was made bishop of Winchester in 984 and archbishop of Canterbury

in 1006. He laboured at the conversion of the Northmen and among his own people for the abolition of slavery. Captured by the Danes at Canterbury in 1011, he refused to raise money for ransom from his tenants, and was murdered April 19, 1012. He was buried in S. Paul's Cathedral. His body was removed in 1023 to Canterbury. Declared by Anselm a saint and martyr, he is commemorated in the dedication of several churches in England. That in London Wall was demolished in 1919, only the porch remaining.

Alpheus. The chief river of Peloponnesus, Greece. The modern Ruphia, it rises in the S.E. of Arcadia, and flows past Olympia to the Ionian Sea. The fact that it was thought to be partly subterranean gave rise to a legend that the nymph Arethusa, surprised while bathing and pursued by the river god Alpheus, was transformed by Artemis into an underground spring, and reappeared in the island of Ortygia, near Syracuse.

Alphonso OR ALFONSO. Masculine Christian name of Teutonic origin, and meaning eager for battle. As Alphonse it is common in France. A Spanish variant is Alonso.

Alphonso (d. c. 914). Last king of Asturias, known as The Great. He succeeded his father Ordoño I in 866. His reign was marked by successes against the Moors and the consolidation of the kingdom of Galicia, but his incessant warfare impoverished his subjects and bred internal disorder. He abdicated, and died at Zamora.

Alphonso (1030-1109). King of Leon and Castile, known as The Brave. After the death of Ferdinand I. of Leon, Castile and Galicia in 1065, his kingdoms were divided between his second son Alphonso and his brothers Sancho and Garcia. War followed. Alphonso was driven out by Sancho and took refuge with Al Mamun, the Moorish king of Toledo. On Sancho's assassination in 1072, Alphonso returned to Leon and united the three kingdoms under his rule. In 1084, after Al Mamun's death, he took Toledo, but was defeated by the Almoravides at Zalaca in 1086.

Alphonso (d. 1134). King of Aragon and Navarre, known as The Fighter. He was the second son of Sancho I of Aragon and the husband of Urraca, daughter and heiress of Alphonso the Brave of Leon and Castile. His marriage was annulled, and he was superseded in Leon and Castile by his stepson. Fighting often against the Moors, in 1118 he took Saragossa, and in 1120 defeated them

at Cutanda. His bequest of his kingdom to the Knights Templars and other military orders was not fulfilled.

Alphonso (1221-84). King of Castile and Leon, surnamed The Astronomer and The Wise. He succeeded to the throne in 1232. He was the first to encourage historians to write in the Castilian tongue. The legal code *Las Siete Partidas* (The Seven Laws) was begun under his patronage. See *Alfonsine Tables*.

Alphonso (1385-1458). King of Aragon, Sicily and Naples, surnamed The Magnanimous. In 1416 he succeeded his father, Ferdinand I, as king of Aragon and Sicily. After a long struggle he took Naples in 1442 and was recognized king by Pope Eugenius IV. He died at Naples.

Alphonso (1643-83). King of Portugal. He was the second son of John IV, whom he succeeded in 1656. As a result of a plot between Alphonso's wife and his brother Pedro, Alphonso was deposed in 1667 in favour of Pedro. Banished to Terceira, in the Azores, he died at Cintra.

Alphonso XII (1857-85). King of Spain, the first Alphonso of united Spain, but the twelfth of Leon and Castile. The son of Queen Isabella II, who abdicated in 1870, he was proclaimed king in 1874, and in 1876 suppressed the Carlist rebellion. After the death in 1878, in the first year of marriage, of his wife, a daughter of the duke of Montpensier, he married Maria Christina, daughter of the archduke Charles Ferdinand of Austria. He died Nov. 25, 1885.

Alphonso XIII (1886-1941). King of Spain. The son of Alphonso XII and his wife Maria Christina, he was born after his father's death, being therefore a king from the day of his birth, May 17, 1886. Until 1906 his mother acted as regent. In 1906 he married Victoria Eugénie (Ena) of Battenberg, niece of Edward VII. On their wedding day, May 31, a bomb, hidden in a bouquet of flowers, was thrown at the bridal coach. This was only one of several attempts made at various times to assassinate the king. In the sphere of politics, because of the laxity of party politicians, more and more responsibility was thrown upon the king during his reign. In 1924 he supported the dictatorial form of government set up by Primo de Rivera (*q.v.*). The municipal elections of 1931 showed large gains for the republican cause and Alphonso left Spain in



Alfonso XIII

April of that year, though without any formal abdication, in the hope of saving Spain from civil war. Thenceforward he lived mostly in Italy, dying in Rome from angina pectoris, Feb. 28, 1941.

He had four sons and two daughters. The eldest and second sons renounced their rights to the Spanish throne, the eldest dying in 1938. Six weeks before his own death Alphonso, finally renouncing his own rights, proclaimed the third and sole surviving son Juan "king of all the Spaniards when Spain judges it opportune." *Consult Life*, Robert Sencourt, 1942.

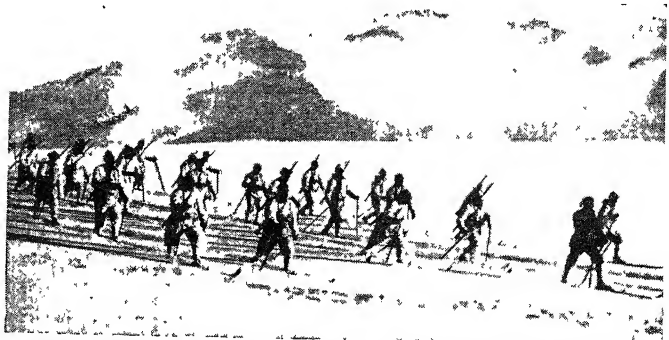
Alpine Club. A British club, the first of its kind, founded in London in 1857. Its membership is confined to those who are interested in mountaineering, especially in connexion with the Alps. It has issued since 1864 *The Alpine Journal*, and its headquarters are at 74, S. Audley Street, London, W. There are many other Alpine clubs in Europe and several in other parts of the world, especially in the U.S.A., Canada, and South Africa.

Alpine Glow. Hues caused at dawn by the falling of light upon the snow of certain Alpine mountains. The snowy expanses which cap the high Alps flush with exquisite shades of colour in anticipation of the sunrise. This recurrent effect contributes to the attractiveness of Switzerland.

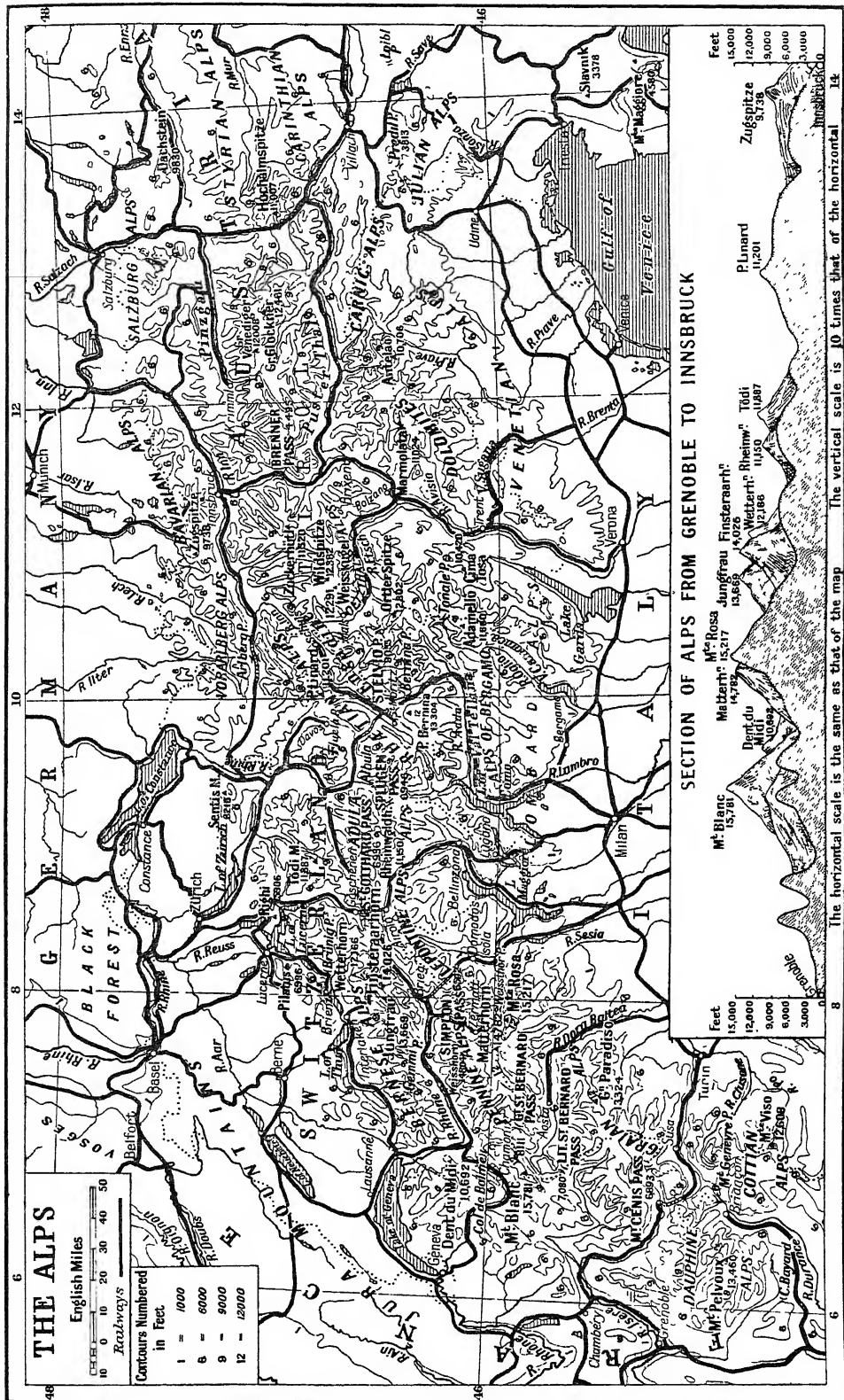
Alpini. Italian soldiers recruited mainly in the Alps and trained for special tasks. They are selected men formed into special regiments, which have pack-mule transport and mountain two-horse vehicles. They do not ordinarily form part of the field armies, but are intended to be employed locally with mountain artillery as covering troops. In 1939 there were five regular divisions.

During the First Great War one of the exploits of the Alpini was the capture of the Adamello glacier. (See *Adamello*.) In the Italo-Greek campaign of 1940-41 the 3rd Alpini division fought against Greek Evzones in the mts. of the Epirus and suffered a heavy defeat at the battle of the Pindus, Nov., 1940. Alpini also fought against British Imperial forces in Eritrea and Abyssinia in 1941, and were used in the African desert campaigns. Italian forces sent to fight in Russia, 1941-43, included Alpini troops, among them the famous Julia division. After Italy's capitulation to the Allies in Sept., 1943, Alpini units fought in Italy against the Germans with the Anglo-U.S. armies. In 1945 many of these troops formed part of the Italian Liberation army, being supplied with British battle-dress.

Alpnach OR ALPNACHT. Village of Switzerland, in the canton of Unterwalden. It stands on the slopes of Mt. Pilatus, 8 m. S.S.W. of Lucerne, a starting point for the ascent, and has a station on the Lucerne-Brünig-Brienzen rly.



Alpini. With rifles slung across their shoulders, patrols of these specialised Italian forces cross a snowfield in the Alps on skis



Although Switzerland is generally regarded as the Alpine country of Europe, the mountainous system to which is given the comprehensive title of the Alps extends west into France, east into Bavaria and Austria, and South into Italy. Indeed, the highest peak of the system, Mont Blanc (15,781 feet), is French territory, having been formally recognized as such by treaty in 1861. All the other peaks above 12,000 feet, which are shown in the section of the Alps from Grenoble to Innsbruck, are, however, in Switzerland

ALPS: GREAT MOUNTAINOUS SYSTEM STRETCHING ACROSS THE BORDERS OF FIVE COUNTRIES

ALPS: MOUNTAIN REGION OF EUROPE

Below is described geographically and historically the mountainous system of south central Europe. Reference is also made to Alpine climbing and literature. See also Dolomites; Geology; Mountaineering; Tirol; Switzerland, etc. Map on page 335

The term Alps is generally used to denote the ranges and groups of lofty mountains in the S. of central Europe, bounded, roughly speaking, on the S. by the Italian plains, on the W. by the Rhône valley, stretching E. almost to the plains of Hungary, and on the N. descending to the less elevated but still hilly country of N. Switzerland, Bavaria, and Upper Austria. They are usually treated as divided into three main sections, the W., Central, and E. Alps. The W. Alps include the Maritime, Cottian, Dauphiné, and Graian Alps; the Central Alps include the Bernese Oberland on the N. and the Pennine Alps on the S. of the upper Rhône valley, the Lepontine, and Adula Alps, Tödi range, N.E. Swiss and the Bernina Alps, and Rhaetian Alps; the E. Alps extend through E. Tirol and Styria and the N. of Venetia and end in the Carinthian, Carnic and Julian Alps.

Meaning of the Word Alps

To represent the Alps as a single defined chain is utterly misleading. It should be noticed that, as used in this mountainous district itself, the word alps does not mean the peaks or mountain ranges, but upland pastures where cattle and goats graze in summer. Rising from the hot low valleys through vineyards on the S. slopes, past the deep gorges through which the torrents force themselves under pine woods or, on the Italian side, groves of chestnuts, a region of clear air, flowers, green pastures, and clear springs is reached: here, too, the peasants have built chalets with the rocks and snowfields above and ravines, woods, and valleys below. So there are Wengern Alp, Riffl Alp, Bel Alp, Engstlen Alp, and hundreds of others on the sides of the higher mountains which have become the playground of Europe.

The region of these Alps is from about 5,000 ft. to 7,000 ft. or more above the sea level: the high mountain peaks rise above them to a height of from 10,000 ft. to 15,000 ft. The few over 14,000 ft. occur only in the group of Mont Blanc, of the central Pennines in the Zermatt region, and one, the Finsteraarhorn, in the Bernese Oberland. The highest peaks of the Alps, further E., viz. the Ortler Spitze, the Gross Glockner, the Gross Venediger, and the Wildspitze, range between 11,000 ft. and 13,000

ft. While only two summits in the whole region are over 15,000 ft. high, there are dozens over 12,000 ft., from Monte Viso in the far W., on the border of Dauphiné and Piedmont, to the Gross Glockner in the E., and many scores over 10,000 ft., in both the main chain and outlying groups.

The Building of the Alps

How was this mountain region, with its infinite variety—a terror to the ancient world, a joy to the modern—formed? Volumes have been written on the subject, elaborate researches made, theories propounded. It seems that the region was first elevated by forces from below. As the earth cooled and its crust contracted, strata, which at first may have been horizontal, were squeezed together by lateral thrusts, often crushed, one part elevated, another depressed. To quote Prof. Bonney, whose work on the Building of the Alps should be carefully studied by all interested in the subject, "Such a chain as the Alps may be described as composed of a series of rock masses, in part at least deposited in successive layers, and then bent into wave-like folds, as a number of heavy carpets laid one on another would be if their opposite ends were brought (pushed) nearer together. These folds are sometimes comparatively gentle, sometimes exceedingly sharp. Occasionally the thrust is so powerful that the folds are bent over in the opposite direction; sometimes the rock masses are even broken under the strain and the upper part of the fold slides forward over the lower. While these disturbances were in process, heat and cold, rain and river, snowslide and glacier, in some cases also waves of the sea, were sculpturing and transporting, so that the mountain peaks are in many cases only remnants of masses far more gigantic; that vast rocky wall which rises so grandly against the sky is a mere ruin of the huge bulwark which once guarded the Italian lowland."

The Alps that from a distance look so still, white with their eternal snows, immutable in their adamantine strength, are really never at rest. Even the stillness of night is broken by the roar of the torrents carving their courses deeper and deeper and bearing with them the stones and sandy

silt which they will deposit in the valleys below, by the thunder of the avalanche, the hissing and howling of the wind among the peaks, and the loud report of breaking ice. "I am well persuaded," says Ruskin, "that the more familiar anyone becomes with the chain of the Alps, the more the idea will force itself upon him of their being mere remnants of large masses, splinters and fragments as of a stranded wreck, the greater part of which has been removed by the waves."

The varying shapes of the higher peaks, whose sharp edges and points show them to have been above the action of glacial ice, are due partly to the influences to which they have been subjected, and partly to the different characters of the rock of which they are compounded. The higher summits are principally of gneiss or mica schist, and sometimes of granite. These older crystalline rocks are flanked by rocks of later origin and include limestones and dolomite in huge masses, with great cliffs. At times they assume the most picturesque and varied forms and the richest colour, as in the dolomite region E. of Botzen on the borders of Italy and Tirol.

Rivers and Great Lakes

A marked feature of the Alpine region is its greater steepness on the S. side; the plain of Lombardy is only a few feet above the sea, whereas the Lake of Constance, which is much farther from the great central ranges, is 1,300 ft. above the sea level. The rivers on the S. side descend with fairly straight course to the Po, while on the N. side the Rhine flows in its rapid upper course N.E. by E. and then N., and, after passing through the great lake, nearly due W., until it turns again N. at Basel.

Crossing the main Pennine chain by the Weissthorn pass near Monte Rosa from the N., you ascend by a long glacier to extensive and rather gentle snow slopes, but on reaching the summit of the pass suddenly look down precipitous rocks thousands of feet into the deep Val d'Anzasca. On the N. side of the pass is the expanse of glacier, with its steady imperceptible movement, on the S. the mountain ridges keep up a recurrent bombardment of falling stones down their precipices.

So on the S. side, the great lakes which fill the deepest depressions in the folds of the mountains—Maggiore, Como and Garda—lie N. and S. at right angles to the main chain; whereas the general direction of those on the N. side,



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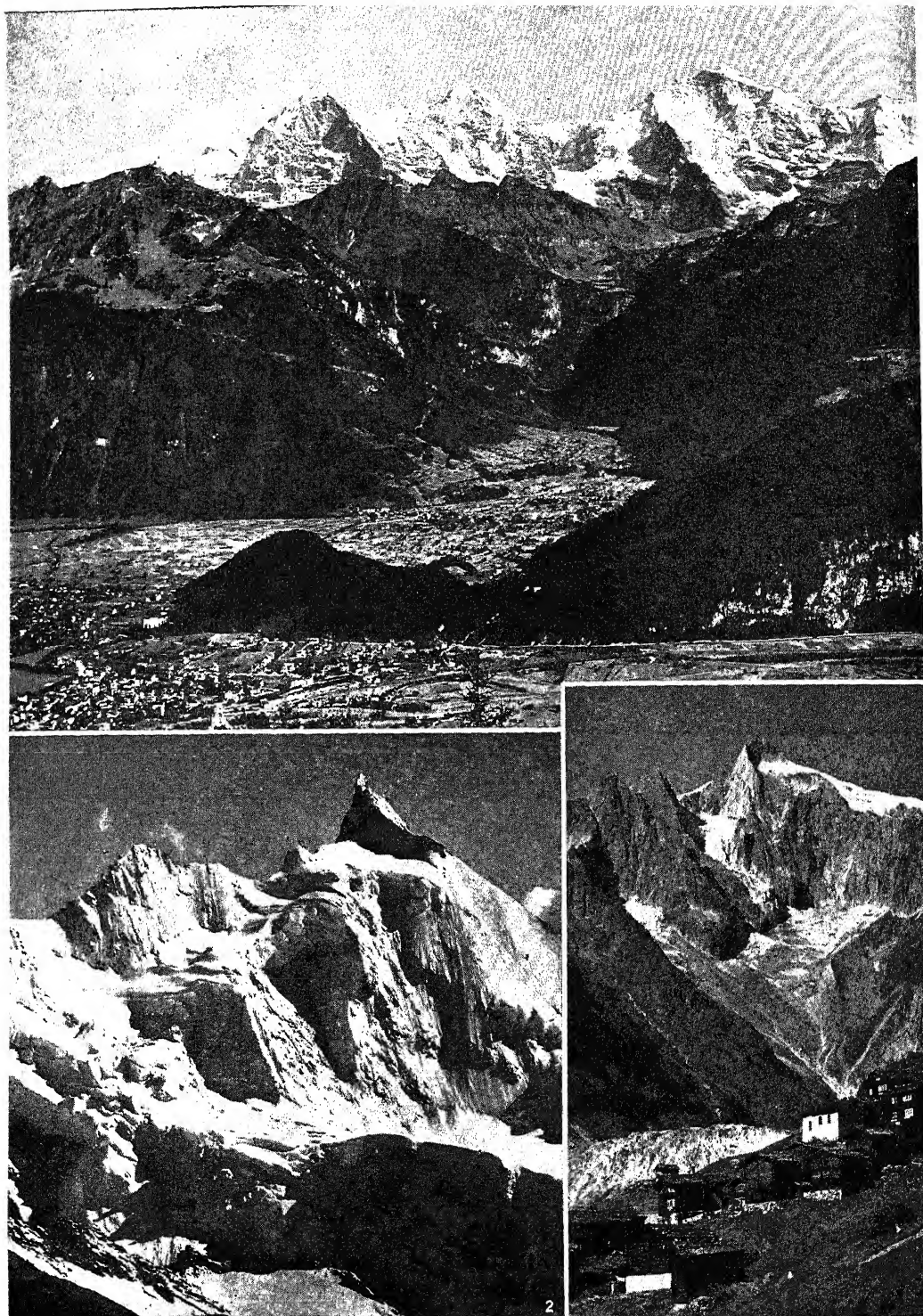
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The Mont Blanc range rises in Haute Savoie and divides France from Switzerland. 1. Steep-sided peaks of the Aiguille Verte and the Aiguille du Dru. 2. The Mer de Glacier, famous glacier over 9 miles in length. 3. General

view of this great chain of the Alps, with Chamonix lying in the valley below; Mont Blanc itself (marked x) is Europe's highest mountain (15,781 ft.), and the first recorded ascent was made in 1786 by two natives of Chamonix

ALPS: WESTERN AND LOFTIEST SECTION OF EUROPE'S GREAT MOUNTAIN SYSTEM

Photos, E.N.A.



1. The Jungfrau group in the Bernese Oberland, which lies north of the Rhône, in the left foreground is Interlaken, a favourite centre for tourists visiting the Oberland in the summer season. 2. Zinal Rothorn, a lofty summit of the Pennine Alps, in the Canton of Valais. 3. The Wannehorn and the Fiescher Glacier, one of the three longest glaciers of the Alps (10 miles). The Swiss Alps particularly may be termed the playground of Europe

ALPS: SOME GIANTS IN THE SPECTACULAR CENTRAL MASS OF PLATEAUX AND PEAKS

Photos, Stump & Co.; A. Kloyfenstein; E.N.A.



1. Eiger and Mönch, two peaks of the Bernese Oberland, both over 13,000 ft. high; below lies Mürren. 2. The Matterhorn in winter showing the railway for ski runners; this sharp and distinctive peak rises to a height of 14,800 ft.

On account of the difficulties and dangers of ascent, it is the most respected of all Alpine peaks. 3. Summer in the Engadine, the upper portion of the Inn valley; in the distance is the mountain known as the Drusenfluh

SWITZERLAND'S TOWERING SNOW-CLAD SUMMITS AND FLOWER-DECKED VALLEYS

Photos, M. Kettel; A. Klopfenstein; O. Furter



1. Snowy crests of the Oetzthaler Alps, in Tirol. 2. Le Tre Cime di Laveredo, typical of the jagged peaks of the Dolomites; before the First Great War they marked the frontier between Austria and Italy. Of limestone

formation, the Dolomites are streaked by veins of vivid colours. 3. Sonnenwelleck and Fuscherkarkopf, with the famous Schleierwasser Falls; in the foreground, the Grossglocknerstrasse, one of the world's highest motor roads

ALPS: MAJESTIC HEIGHTS OF THE GREAT TIROLESE RANGE AND OF THE DOLOMITES

Photos, Dorien Leigh; E.N.A.

Lucerne, Zurich, and Constance, and also the Lake of Geneva, which lies N. of the highest mountains—though the Rhône, after flowing almost N. from Martigny to the lake, ultimately bends to the S.—is E. and W., parallel to the main chain. No water from the Alps goes to the Baltic; it is to the Danube that by far the greater part of the E. Alps is drained.

Historically the Alps have formed a barrier between N. Europe and Italy, impassable except by certain well-known routes, and then as a rule only in summer. The lowest important pass across the main chain is the Brenner (4,500 ft.), dividing the mountains of E. and W. Tirol. It was known to the Romans and used by the barbarian invaders. By this pass the first railway route from Germany to Italy crossed the Alps. It was opened in 1867, and the main ranges have since been pierced by railways near Mont Cenis in the W. in 1871, in the centre by the St. Gotthard tunnel in 1882, and between the Rhône Valley and the Lago Maggiore by the Simplon in 1906. From the time of Hannibal the crossing of the Alps has been a difficult problem for military leaders aiming at Italy, and the story of the various Alpine passes is full of interest. The Alpine region, too, has been the home of a hardy race, free and independent, protected from many of the devastating wars which have swept over the plains. Despotism does not flourish in mountain air.

Some Notable Ascents

Alpine climbing, as a sport exercising body and mind, may be taken to date from the middle of the 19th century. Prior to that time some of the higher Alps had been ascended, notably Mont Blanc, the summit of which was first reached by two guides from Chamonix in 1786, at the instance of De Saussure, and by De Saussure himself the following year. Other peaks were conquered, especially in the Oberland, early in the 19th century. In 1854 came the ascent of the Wetterhorn by Alfred Wills (afterwards Mr. Justice Wills), brilliantly recorded in his *Wanderings Among the High Alps*; in 1855 of Monte Rosa by G. and C. Smyth and others of an English party; in 1861 of the Weisshorn by Tyndall, and in 1865 of the Matterhorn by Edward Whymper with a party of seven, four of whom lost their lives in a terrible accident when descending. Since that time almost every

peak in the whole Alpine region has been repeatedly ascended. The English Alpine Club was formed in 1857, and in its *Journal* since 1864 has published regularly accounts of new routes. No corner of the mountain region of central Europe now remains unexplored. "Climbing is no longer a laborious curiosity." Each of the greater peaks is the subject of a regular tariff of fees for guides, who often convey quite inexperienced tourists to places once deemed inaccessible.

Weather and Climbing

But still for the true climber there are difficulties to be surmounted, taxing all the energies of body and mind to the utmost. Weather conditions may make an "easy mountain" difficult, dangerous, or impossible. Mountain craft is learned only with close attention and long practice.

Alpine literature, dealing not only with climbing and discovery but with the geology and petrology of the mountains, their flora and fauna, and the ethnology and history of the inhabitants, now forms a great library.

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Alpujarras, LAS (Arabic *Al-busharat*, land of rich pasture). Mountainous district in Granada and Almeria provs., Spain, S. of the Sierra Nevada and N. of the Sierra Contraviesca. Beautiful and fertile, it produces grapes, oranges, and figs in abundance.

Alruna. In Norse mythology, the runes which were whispered to Odin by Mimir's head after it had been cut off by the Vanir. These runes, or wise sayings, were distributed among the Aesir, the Elves, the Vanir, and mortal men.

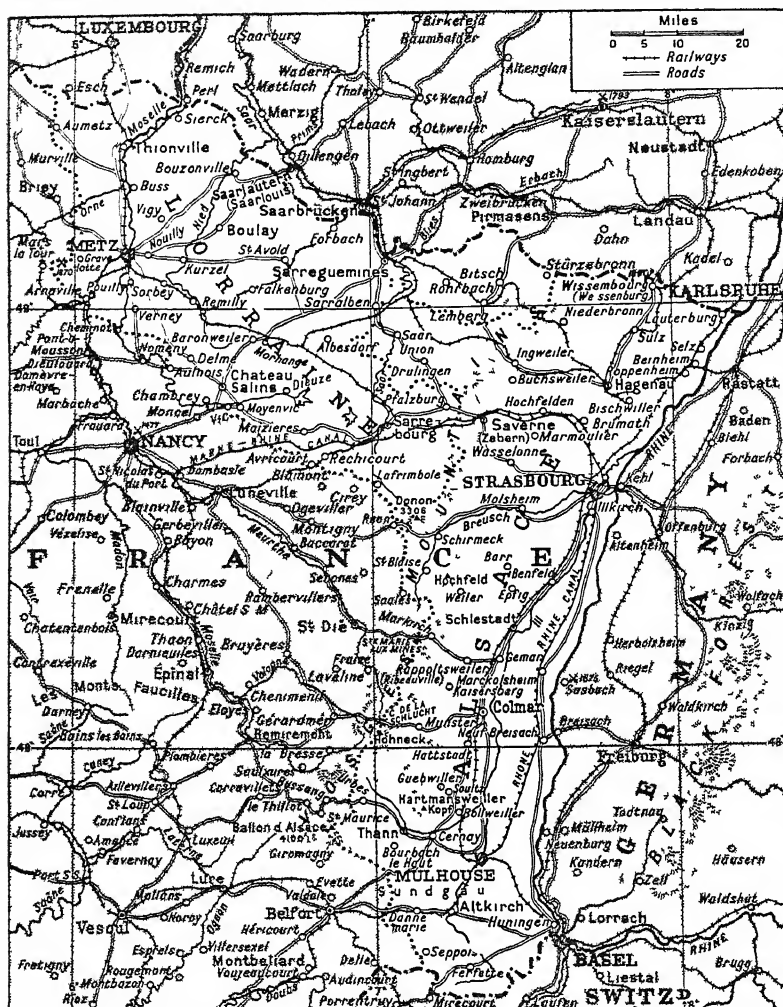
Alsace (Ger. *Elsass*). District of France between the Rhine and the Vosges Mts., with Lorraine to the N. and Switzerland to the S. It comprises the departments of

Bas and Haut Rhin, and covers about 3,200 sq. m. Strasbourg is the historic capital, other important towns being Colmar and Mulhouse. Its chief river is the Ill, and geographically it is divided into two parts, a mountainous region in the W. and a plain in the E. Well timbered and fertile, it is largely engaged in agriculture. Wine is produced, and manufactures include leather, glass, chemicals, and cotton and woollen goods. Pop. (pre-war) 1,219,381.

Alsace has had a varied history. The name probably means the country of the Ill, and its earliest inhabitants of whom anything is known were Celtic tribes, who were subdued by King Ariovistus, he in his turn falling victim to the superior genius of Julius Caesar. For nearly 500 years Alsace was part of the Roman Empire, and in the 4th century it was seized by the Alamanni. Later it became part of the kingdom of the Franks; in 870, by virtue of a treaty, it became German, and for some time was part of the German duchy of Swabia. In the 12th century, being still in the German kingdom, it was ruled by land-graves, between whom and the prospering towns there was considerable rivalry. About 1500 the Alsatian peasantry revolted against the miseries of their lot, and a few years later the Alsatian townsmen eagerly accepted the teachings of the Reformers.

In the 16th century there was a good deal of intercourse between France and Alsace, and after the Thirty Years' War had ravaged the land Louis XIV obtained possession of it. He did this by making the most of certain rights handed over to France by the treaty of 1648, and in 1681 finished the work by sending his troops to seize Strasbourg. Then, by treaty in 1684, Alsace became part of France, and so remained until 1871. In the main this was a prosperous period, although in the 18th century there was a certain amount of religious persecution, and in the early 19th a marked dislike of the restored Bourbon kings. In 1871, following the Franco-Prussian war, Alsace was taken by Germany and with most of Lorraine became the imperial province of Elsass-Lothringen, known outside Germany as Alsace-Lorraine. The story of Alsace-Lorraine from 1871 to 1919 is told under that heading.

The recovery of this lost territory was an avowed desire of France for over forty years, and



Alsace and Lorraine. These two countries were taken by Germany from France after the war of 1870-71, and restored to France by the peace treaty following the First Great War. They were again in German occupation from June, 1940, to November, 1944

the early stages of the First Great War saw some abortive French attempts to stage attacks in Alsace. They could not be sustained because of the need for a concentration of French force in meeting the development of the German advance through Belgium. Only one French army could be spared to hold the Vosges as far N as Donon. The Germans were equally unable to sustain any offensive, as they had to send men to Flanders and the Aisne. A French attempt to advance on Mulhouse at the end of 1914 was checked by the Germans, and finally stopped by violent snowstorms early in the new year.

Thenceforward the position was one of stalemate to the end of the

war. The Germans had the advantage of an admirably system, which enabled them to move troops quickly from point to point. Moreover, it became clear to the French that unless they were prepared to besiege Strasbourg and venture a major campaign on the Upper Rhine, there was nothing to achieve by small local advances.

Alsace, with Lorraine, was restored to France in 1919 by the treaty of Versailles. A very real problem arose, however, through the large number of its inhabitants who were German in speech and culture if not in political leaning. In 1926 a movement was launched for local autonomy, and some semi-Nazi parties came into being.

These were suppressed, a number of the leaders being arrested in 1939 after the outbreak of the Second Great War.

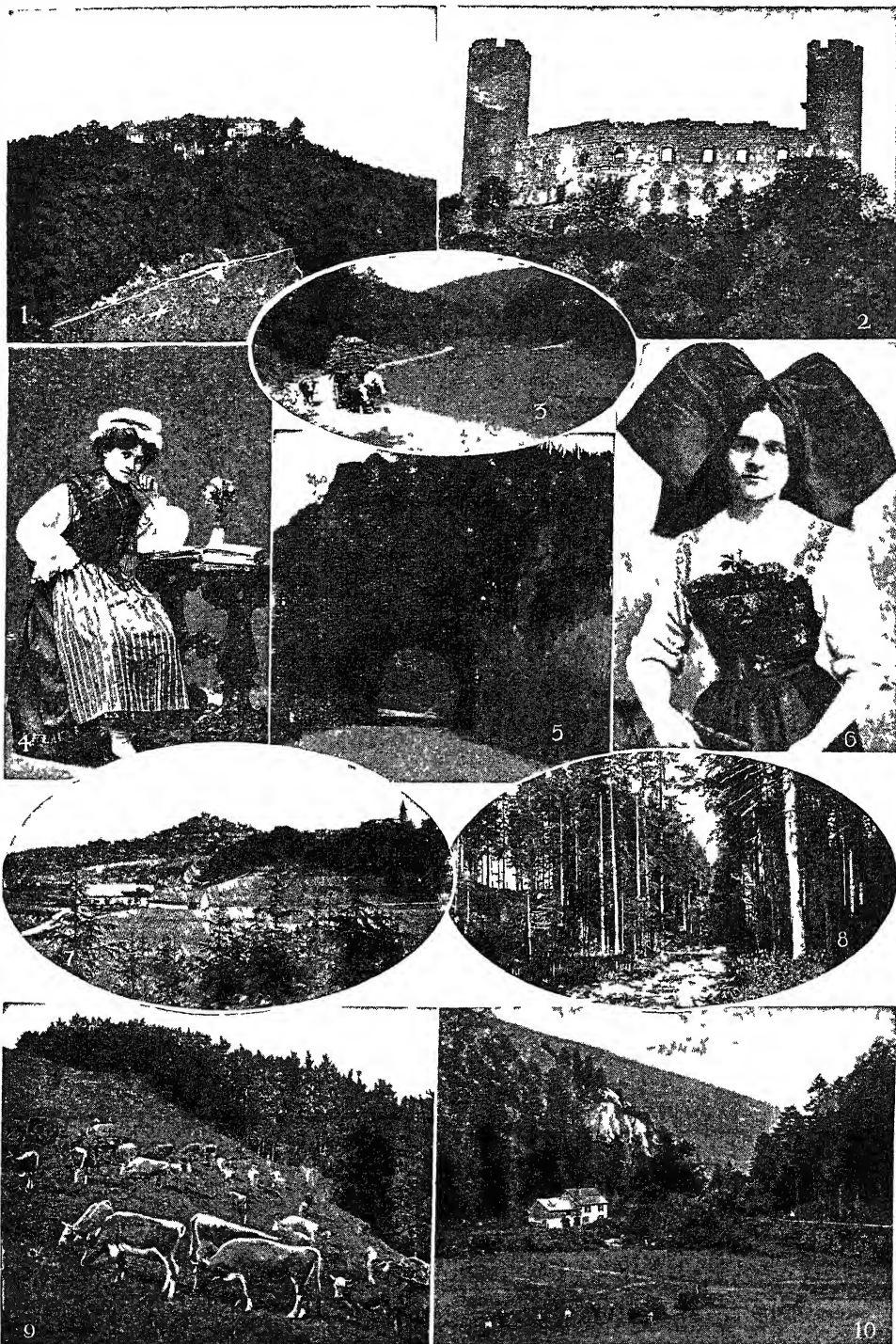
Strongly fortified sections of the Maginot line (q v) ran along the French side of the boundary between Alsace and Germany, the town of Strasbourg being included in the great defensive works. But in May and June, 1940, the Maginot line was outflanked from the N, and with the surrender of Belfort, Mulhouse, and Strasbourg further resistance in Alsace was useless. Many French soldiers escaped to Switzerland. On June 23, the day after the acceptance by the French govt of the German armistice terms, the Germans announced the end of the battle of Alsace with the capture, including those taken in Lorraine, of half a million prisoners.

By August, 1940, the names of all streets, shops, and hotels in Alsace were changed from French to German. Only German newspapers were permitted in Strasbourg. A Nazi Gauleiter was appointed, who declared that Alsace would "rapidly retake its old

place within the great German national community." In Sept., 1940, the German language was proclaimed (by radio) to be the official language of Alsace.

In Feb., 1942, the creation was announced of a "greater Strasbourg," by the amalgamation of the Alsatian capital with the German town of Kehl on the opposite bank of the Rhine. German civil law was introduced in 1943, and heavy repressive measures such as deportation to Germany, forced labour in settlements, or imprisonment in concentration camps, were taken against any sign of resistance.

After the rapid Allied advance across France in Aug and Sept., 1944, Gen Patton's 3rd U.S. army



1 Ste Odile, containing the shrine of S Odila, the patron saint of Alsace, W of Barr 2, Château Andlau, near Barr 3 Typical wayside scene 4 and 6 Types of costumes of Lorraine and Alsace 5 The Schlucht (ravine), one of the passes through the Vosges

7 Lichtenberg, scene of great French heroism in the Franco-Prussian war 8 Among the pine woods of Lorraine. 9 Cattle on an upland pasture 10 In an Alsatian valley, with the massive Ballon d'Alsace, a great rounded summit of the Vosges, in the background

ALSACE-LORRAINE: VARIED BEAUTIES OF THESE HISTORY-LINKED LANDS

swept to the Maginot line in the Alsace region. Strasbourg fell to French troops on Nov. 23. There were German counter-attacks in N. Alsace and the Colmar area in Dec., 1944, and Jan., 1945, but they were fiercely resisted; and on Feb. 9, 1945, it was announced that the whole of Alsace was once more cleared of German troops. *See also* Lorraine.

Alsace-Lorraine. District consisting of most of Alsace and a considerable portion of Lorraine, taken by the Germans from France in 1871 and restored to France in 1919. Seized from France in 1940, it again became part of the German Reich, until liberated in the Allied campaign of 1944-45.

The area is 5,605 sq. m. Under the German rule of 1871-1919 it was divided into three districts, Upper Alsace, Lower Alsace, and Lorraine. The French departments covering the area are Haut-Rhin, Bas-Rhin, and Moselle.

The treaty signed at Frankfurt between France and Germany in 1871 provided for the cession of Alsace, except only the fortress of Belfort and a region around it, and of the E. part of Lorraine, the W. part remaining French.

The object of Germany was to make the imperial province of Elsass-Lothringen, as the Germans called it, a thoroughly German district. An article in the treaty of 1871 allowed those inhabitants who wished to remain under French rule to move away within fifteen months. Nearly 60,000 persons did so. After 1875 trouble arose owing to the arbitrary action of the Germans. The deputy from Metz was expelled from the Reichstag, social organizations were dissolved, and four Alsatians were punished for belonging to a league of patriots. Moreover, schools were closed and prominent persons exiled, deprived of office, or punished in other ways. The use of French names, both for Christian names and trading purposes, was forbidden, the German garrisons were increased, and steps were taken to make Strasbourg University a centre of German influence. After about 1895 there was somewhat less of this repressive policy, and the French spirit was strong enough to demand in 1905 the compulsory teaching of French in the schools. The Germans, however, had achieved their main end, since in 1910 1,643,260 of the inhabitants (nearly 90 p.c.) spoke German, and only 204,262 spoke French. This led to difficulties for the French when the



Alsatian Wolf Dog. Breed of large, powerful, and intelligent dog

territory was restored to them by the Treaty of Versailles, 1919.

After the fall of France in June, 1940, the Germans promptly annexed the district, incorporating it in the Reich once more. Lorraine, with the Saar, made up the German Westmark, with a status similar to that of Ostmark (Austria). Two Nazi gauleiters were appointed, one for Alsace, the other for Lorraine. The use of the French language was forbidden and every attempt was once more made to Germanise the people by force. This attempt ended abruptly with the liberation of Alsace and Lorraine by Allied armies in the battles of 1944-45. *See* Alsace; Lorraine.

Alsatia. Name given to a sanctuary, or refuge for malefactors, in the Whitefriars district of London, between Fleet Street and the Thames. Alsace, or Alsatia, was debatable land between France and Germany, hence the application of the term. The sanctuary had a rude but flourishing existence during the 17th century, and was deprived of its privilege in 1697. Scenes in Scott's novel, *The Fortunes of Nigel*, are laid here. The site is now occupied partly by printing and publishing houses.

Alsatian Wolf Dog, OR GERMAN SHEPHERD DOG. Originally bred by Alsace shepherds before the First Great War, this handsome and unusually intelligent dog attracted notice by its work in the battlefield with the German and French armies, and sprang rapidly to popularity in the United Kingdom during the 1920s. When properly handled and trained in habits of strict obedience, the Alsatian is an agreeable companion in the home, strong, active, high-spirited, and requiring plenty of exercise. A good specimen stands from 22 to 26 ins. high at the shoulder, and has a general wolf-like appearance, with an alert, vigilant carriage of head and ears, and a smooth close coat of

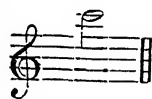
grey, fawn, black, or black and tan. Alsatians are widely used for police work and as guide dogs for the blind. A beneficent use to which they were put in the Second Great War was in assisting Civil Defence workers to locate people who had been buried under the rubble of bombed buildings. *See* Animal; Employment in Wartime.

Alsen. Island of Slesvig-Holstein, in the Little Belt. Separated from the mainland by Alsen Sound, which narrows down from 2½ m. to 300 yds., its length is 20 m., breadth 11 m., and area 124 sq. m. Deeply indented on the W., it is picturesque and fertile and has fine orchards. Sonderborg, its chief town, has a good harbour and an old castle, in which Christian II of Denmark and Norway was imprisoned from 1532-49; from it a rly. runs N. to Norborg. Formerly Danish, it was captured by the Prussians in 1864, the event bringing the Danish war to an end. In 1920 it was returned to Denmark as the result of a plebiscite.

Alster. River of Slesvig-Holstein. It is a tributary of the Elbe, which it joins at Hamburg. It is 32 m. long, and navigable. Outside Hamburg it forms a large lake, the Outer Alster (about 430 acres), and within the town a smaller lake, the Inner Alster.

Alston. Market town of Cumberland, England, in the extreme E. of the co. Lying nearly 1,000 ft. above sea-level in the south Tyne valley of the Pennines, it claims to be the highest market town in England. Lead-mining has flourished, but the deposits are nearing exhaustion. Manufactures include flannel and thread. There is railway connexion with Haltwhistle, Northumberland. Market day, Sat. Pop. 2,678.

Alt (Ital. *alto*, high). In music, the first octave of musical notes above the treble stave. C in alt:



Altaian. Term denoting a branch of the human race whose physical and social characters were developed under mounted nomadism on the Central Asian steppes. It is preferable to Tartar or Turanian, as Altaic or Ural-Altaic denotes its language family. The physical type is marked by a sturdy, strong-boned, medium-sized, waddling body, with weak calves, shortish feet, wheat to bronze skin-tint, large mouth, broad face, flat nose, round head, prominent cheek-bones, low forehead, wide-set, keen-visioned,

deep-sunk eyes, brown to black, in oblique orbits, coarse, lank hair, and scanty beard. It includes the Mongol, Tungus, and Turkic stocks.

Altai Mountains. Great system of mts. in W. Siberia and Mongolia. The Mongolian name is *Altai-nula*, meaning golden mountains. They hem in the Central Asian plateau on the S. and S.W., and comprise the Russian Altai, extending N. from the river Irtysh to the Siberian Rly., and the Mongolian or Great Altai, running E. into the desert of Gobi. The Russian Altai contain the highest summit, Mt. Bieluka, estimated at 11,000 ft. The scenery for the most part is romantic. The region is rich in minerals, including coal, iron, gold, silver, lead, zinc, and copper, and porphyry, aquamarine, and jasper are found. Agriculture is pursued in the valleys.

Altair OR **ALPHA AQUILAE.** A white star, the soaring eagle of

the ancient astronomers. Its magnitude is 0.95 or brighter than the first magnitude, and its intrinsic brightness is about nine times that of the sun.

Altamaha. River of Georgia, U.S.A. Formed by the union of the Oconee and Ocmulgee, after a S.E. course of about 150 m. it enters the Atlantic by a considerable estuary 11 m. below Darien. It is navigable by small vessels.

Altamira. Palaeolithic cave, 308 yds. long, in Santander province, Spain. Herein, in 1879, mural paintings and engravings of the Magdalenian period were discovered, including polychrome roof-frescoes of animal subjects, mostly bison—a masterpiece of prehistoric art. See Art, Prehistoric.

Altamura. Town of Italy, in Bari province. It is 56 m. by rly. S.W. of Bari, *via Gioia del Colle*, has a cathedral founded in 1230, twice restored, and trades in wine, cereals, and cattle. Pop. 27,000.

Altar (Lat. *altare*, high place). Originally a structure on which victims were sacrificed or offerings of various kinds made to a divinity; in Christian churches, a table or stone on which the Holy Eucharist is offered. In prehistoric times altars were mounds, the high places of the Bible (2 Kings 23), or structures there set up, on which sacrifices or oblations were offered, and where the gods worshipped were supposed to dwell.

Among the Greeks and Romans altars were originally heaps of earth or turf; later, as were Oriental and Hebrew altars, they were round, oblong, or square structures of stone. They were decorated with garlands of leaves and flowers, sometimes with bas-reliefs and mouldings. As a rule every temple had two altars, a higher outside for sacrifice, and a lower inside for incense offerings and libations. Altars, which from early times were places of sanctuary (Ex. 21; 1 Kings 1 and 2), were also set up in the streets to the special divinity of the neighbourhood, in camps, and in private houses for the worship of the household gods.

The first altar mentioned in the Bible is that built by Noah (Gen. 8). In Moses' tabernacle and Solomon's temple were the altar of sacrifice or burnt-offering (Ex. 27, 1 Kings 8) and that of incense (Ex. 30, 1 Chr. 28), incense being a symbol of prayer (Ps. 141). Early Christians used tombs of martyrs in the catacombs as altars—hence stone or marble altars in Roman Catholic churches enclose relics of saints; then portable wooden tables came into use. Augustine refers to the *Mensa Domini*, Lord's Table, though the word table may mean what is partaken of as well as the table itself. From the rule one altar one church, still observed in the Greek Communion, altars in the Latin Church grew in number and magnificence as the churches grew in size, S. Peter's, Rome, having 29 in addition to the high altar.

The first English Prayer Book employs the words altar and God's Board; in the second Prayer Book, the words Table, Holy Table, or Lord's Table were substituted, though altar was retained in the Coronation service. Ecclesiastical courts have ruled that in the English Church altars must be of wood and movable. A small portable altar of wood, attributed to the 7th century, is in Durham cathedral library. From 1552, in English churches, the altar was commonly placed lengthwise in the chancel or body of the church; after 1660 it was replaced



Altamira. Vivid impression by a modern artist of prehistoric men decorating the interior of their cave. The animals shown are such as were discovered in the Altamira cave, Santander province, Spain, in 1879

A. Foregier



altarwise at the east end. The oldest known altar is in S. John Lateran, Rome; once in the catacombs, it is in form an ark-like chest, on the lid of which the Eucharist was offered.

Altar. An extinct volcano of Ecuador. A peak of the Eastern Andes, its height is about 16,300 ft. The name is also that of a river and town thereon in Sonora prov., Mexico.

Altazimuth (Lat. *altus*, high; Arab. *as-samut*, ways or paths). Instrument used in astronomy to

determine the exact apparent position of a star in the heavens at any instant. The star is observed through a telescope, which is in contact with a graduated vertical circle, the telescope being free to turn about a horizontal axis through the centre of the circle and perpendicular to its plane. The whole apparatus is so mounted that it can be rotated about a vertical axis, and the angle of rotation is shown by means of a graduated horizontal circle. Thus, when the telescope is pointed at a star, the reading on the graduated vertical circle gives the altitude of the star, and the reading on the horizontal circle gives the angle through which the vertical circle must be rotated from its standard north-and-south position in order

that its plane may pass through the star. This angle is called the azimuth, and altitude and azimuth together determine the star's apparent position. Altazimuths are used mostly on objects which cross the meridian in daylight.

Altcar. Village of Lancashire, England. It lies 2 m. S.E. of Formby, and is the headquarters of coursing in England, the Waterloo Cup being decided here annually in Feb.

Altdamm. Town of Poland, in Pomerania, with manufactures based on potato crops, *e.g.* starch and cellulose. It is at the head of the Dammsche See, 5 m. E. of

1505 to his birthplace, Ratisbon (Regensburg), where he was engaged upon a picture for the church of S. Peter. He designed the city ramparts against a Turkish invasion. Of his paintings, the Battle of Arbela and S. George and the Dragon (Munich) and a Nativity (Bremen) are notable. His talent as an engraver on both copper and wood gives him a place with the Little Masters. *Consult* Altdorfer, T. S. Moore, 1900.

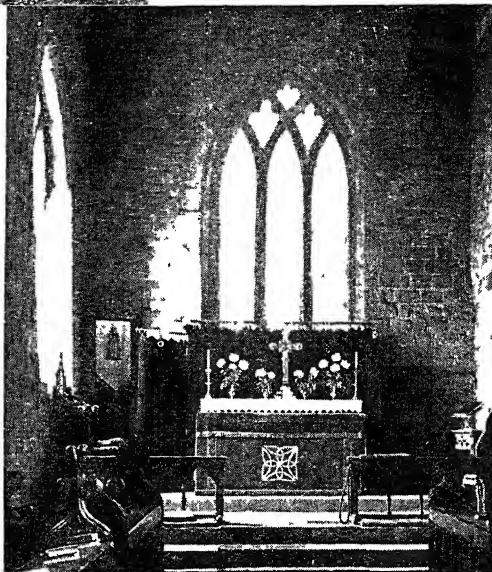
Alten, KARL AUGUST, COUNT VON (1764-1840). A Hanoverian soldier. After serving in the Hanoverian army until it was disbanded in 1803, he joined the German legion in the British army, and fought in several campaigns between 1805-9. He commanded the famous division of light infantry in the later battles of the Peninsular War, and led a division at Waterloo, where he was wounded. In 1818 Alten, known in Britain as Sir Charles Alten, returned to Hanover and became minister for war and foreign affairs there, positions which he held until his death, April 20, 1840.

Altenburg. Capital of the former duchy of Saxe-Altenburg, Germany, 26 m. by rly. S. of Leipzig. It has a 14th century castle on a rock and a 16th century town hall. It manufactures bricks, cement, cigars, woollens, gloves, hats, playing cards, optical instruments, and sewing-machines. Pop. 42,570.

Alten Fjord (OR FIORD). Inlet of Norway, in Finnmark co., in the Arctic circle. Running S. from Soro sound, it breaks into two arms, the town of Alten lying between them. On Sept. 22, 1943, the Tirpitz, then the largest and most powerful German battleship, was damaged by British midget submarines while at anchor in Alten fjord, and further damage was inflicted on her there in an attack by Barracuda aircraft of the Fleet Air Arm on April 3, 1944. The German battleship Scharnhorst also used Alten Fjord as a hiding-place for a time. She was enticed therefrom by the sight of a Russian-bound British convoy on Dec. 26, 1943, and did not return, being sunk off North Cape after a twelve-hour chase by units of the British Home fleet. *See* map, p. 347.

Altengaard. A seaport of Norway, in Finnmark co. At the head of Alten fjord, 53 m. S. of Hammerfest, it has a meteorological and magnetic station.

Altenstein. Castle in Thuringia, Germany. It is 13 m. S.E.



Altar. Simple altar in the side chapel of a Gothic church at Jarow, Durham. Above left, altar to an "unknown god" standing on the west of the Palatine Hill, Rome; it dates from about 100 B.C.

Stettin on the rly. to Danzig. A bastion in the defence of Stettin during the Soviet army's drive through Prussia in 1945, it fell, after some resistance, to troops of Marshal Zhukov's 1st White Russian front on March 20.

Altdorf OR ALTORF. Capital of Uri canton, Switzerland. A station on the S. Gotthard rly., it is 2 m. from Fluelen, on Lake Lucerne, and is the legendary scene of William Tell's shooting the apple from his son's head, a tradition commemorated by a bronze statue erected in 1895. In the immediate neighbourhood is Burglen, the traditional birthplace of Tell. Pop. 4,000.

Altdorfer, ALBRECHT (c. 1480-1538). German painter and engraver. After spending his early years at Amberg he returned in

of Eisenach, and was a summer residence of the duke of Saxe-Meiningen. S. Boniface preached here in 724-7, and here Luther was arrested in 1521.

Alternating Current. Electric current which flows or oscillates for a certain time in one direction followed by a flow in the opposite direction. It is produced by an alternator, a thermionic valve generator, or by other means. In one period, or cycle, the current grows from zero to its maximum positive value, falls to zero, reverses its direction, grows to maximum negative value, and falls to zero. The simplest alternating current passes through this cycle of changes in a definite time, e.g. 50 cycles per second in the standard supply system of Great Britain, or 877,000 (877 kilocycles) per second in the 342.1 metre wavelength of the high-frequency radio transmission of the B.B.C. The number of cycles per second is the frequency.

In direct or continuous current circuits the current, or electron flow, is steady and does not vary in magnitude or direction.

An alternator generates single or polyphase alternating currents. Three-phase A.C. is standard in British power stations. This means that three currents are generated, each having separate, overlapping cycles, and each rising and falling to maximum and minimum voltages 50 times a second. The peak, or maximum voltage, of the first phase is

followed by the peak of the second, and this in turn by the peak of the third.

Alternating current (A.C.) is far more economic than direct current for transmitting power over distances for which high voltages are essential, and alternators are more convenient than dynamos for generating high voltages, capacities as high as 33,000 volts (33 kv.) being standard. A.C. is also readily transformed, voltages being raised or lowered by machines (transformers) without moving parts. See Alternator.

Alternation of Generations. Term employed to denote, in the life history of certain plants, the appearance of two distinct generations. These differ considerably in appearance; one having male and female individuals, the other no distinction of plant-sex.

Nearly all plants exhibit true reproduction, that is, reproduction by means of special cells. These cells may be produced in two ways. (1) The reproductive cell may be capable of itself of giving rise to a new individual. This is the asexual method. These cells are called by a variety of names—micro-spores, macro-spores, zoospores, etc. (2) The reproduction may be the result of the union of two specialised reproductive cells, neither of which by itself is capable of giving rise to a new individual. This is the sexual method. In most of the cryptogams or seedless plants, such as ferns, the union takes

place between two cells which differ widely in size and form, and one of which is male (antherozoid) and the other female (oo-sphere). As a consequence of this process, termed fertilisation, the female cell becomes surrounded by a cell wall and is then termed an oospore. In the higher cryptogams it is observable that a reproductive cell, whether produced by the asexual or the fertilisation method, does not give birth to an individual plant similar to the one which bore it. If it be a spore, or asexual, it gives

rise to an individual which bears sexual organs; if it be an oospore, or sexual, it gives rise to an individual with spores.

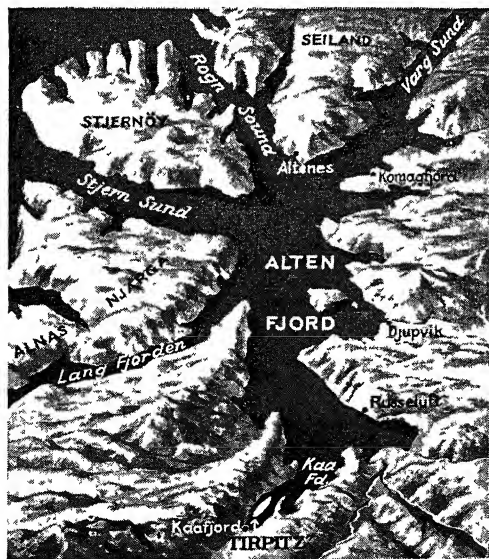
Thus there appear two distinct generations in the life of one of these cryptogams, of which the first, termed the sporophore, is asexual and bears spores, and the second, termed the oophore, is sexual and comprises plants with the male and female reproductive organs. In a moss, for example, the ordinary moss as we see it is the oophore. The product of the development of its oospore is not similar to the parent plant, but is something quite different from moss, viz. a sporogonium in which spores are formed. Again, when the spore of a fern germinates it does not give birth to a fern with stem and leaves carrying spores, but to a small flattened cellular body having male and female organs. From one of the fertilised oospores of this small cellular body the ordinary spore-bearing fern again reappears. See Cluster-cup; Fern; Fungi; Moss; Prothallus; Rust.

Alternative Vote. Method of voting to secure, so its supporters claim, a fairer expression of the electors' will. See Proportional Representation.

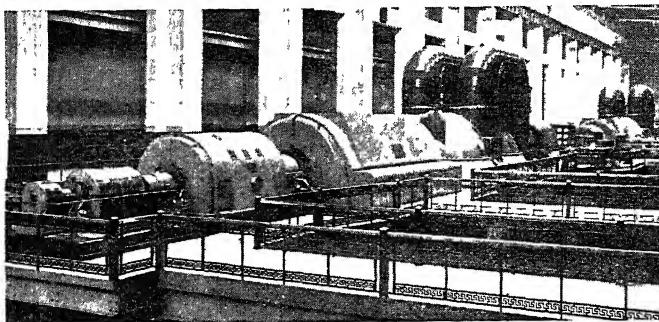
Alternator. Electro-magnetic machine which generates alternating current (*q.v.*), similar in principle to the dynamo in which the A.C. produced is rectified by a commutator to give direct current. As A.C. is almost exclusively used for large-scale electric power and lighting all modern power-station generators are alternators.

An alternator consists essentially of an armature, usually stationary and called the stator, and a field magnet system, usually rotating and called the rotor. The electro-magnets of the field magnet system are excited, that is, magnetised, by direct current from a small dynamo called the exciter. Alternators are driven at standard speed (dependent upon the number of magnetic poles) to give a current of standard frequency (50 cycles). Thus, for two magnetic poles (1 pair, N. and S.) the speed must be 3,000 r.p.m., for 4 poles (2 pairs) 1,500 r.p.m., and so on. High speeds are desirable for efficiency.

The principle of alternator operation is, in simple terms, as follows. Electric current is produced when a conductor (insulated) cuts the lines of force in a magnetic field. To overcome



Alten Fjord. Norwegian inlet used as the base for the German battleship Tirpitz, 1942-44. See p. 348



Alternator. Two of the main turbo-alternators installed in 1939-40 at Battersea Power Station. They generate 69,000 kW

construction problems in alternators the magnetic field (the rotor) is rotated, not the conductors. Current (rising and falling in voltage value 50 times per second) is produced in the conductors of the armature (stator). Direct current from the exciter is led to the rotor (to produce the magnetic field) by brushes which press on slip rings on the rotor shaft. The current generated in the stator is led away direct to switchboards by cables to the mains and external transmission lines. No commutator is required. More than one current can be generated in a cycle according to the number of separate conductors to each pair of magnetic poles. Normal practice employs three conductor systems giving three-phase current. In the overhead transmission systems used all over Britain four lines, or conductors, are seen; one (uninsulated) is the earth line, the other three (insulated) carry the three-phase supply. Polyphase alternators, *i.e.* 4, 6 or more phases, are also employed for certain purposes.

Alternators may be driven by steam engines (slow speeds), water turbines (varying speeds), or steam turbines (high speeds). The last are usually called turbo-alternators and are used in all British power stations since they give high output with high efficiency. In the great Battersea power station of the "grid" system there were in 1946 three turbo-alternators, two each generating 69,000 kilowatts at 3,000 r.p.m., and a third giving 105,000 kilowatts at 1,500 r.p.m. Battersea was designed for a total output of 550,000 kilowatts (or about 50,000 amperes at 11,000 volts). Large turbo-alternators are also installed at Barking, Fulham, Hams Hall near Birmingham, and other stations of the "grid" system. *See* Alternating Current.

Althing. Name of the parliament of Iceland. The Scandinavian word *thing* means an assembly, and is found in storthing and husting. The Althing, or assembly of the elders, dates from the 10th century, but its present form only from 1874, when the king of Denmark gave a constitution to Iceland. It consists of 52 members elected by universal suffrage. The upper house consists of one third of the members elected by the whole Althing in session; the lower house of the remainder. After Germany invaded Denmark, April 9, 1940, the Althing assumed the royal power next day, and on May 16, 1941, terminated the union with Denmark.

Althorn. A brass musical instrument of tenor pitch, the E flat or F saxhorn. The name is also sometimes applied to the baritone saxhorn in B flat.

Althorp. Seat of Earl Spencer. It is 5 m. N.W. of Northampton, 1 m. from Althorp Park rly. stn. The estate has belonged to the Spencers since the time of Henry VII. The mansion dates from the Tudor period, but has been largely altered, in part by the 1st countess of Sunderland, Waller's Saccharissa. The house contains some fine portraits by Gainsborough, Reynolds, Van Dyck, and Lely, and paintings by Holbein, Murillo, Rembrandt, Hals, and others.

Althorp, Viscount. Title taken from a village near Northampton, or from the family seat there (*v.s.*), and used as a courtesy title by the eldest son of Earl Spencer (*q.v.*).

Althorp Library. Collection of more than 40,000 volumes now in the John Rylands Library at Manchester.

Altimeter. Instrument constructed on the principle of the aneroid barometer to register the height attained by an aircraft. It is actuated by a collapsible metal capsule exhausted of air, the shape

of the capsule being altered by changes in the pressure of the atmosphere surrounding it. The face of the capsule is linked, through gearing, to a direct-reading indicating needle. Three capsules may be interconnected to make the instrument more sensitive. Various devices are employed to correct errors due to varying atmospheric pressure at the same height and other causes, and the error of the modern altimeter does not exceed 0.5 per cent at 15,000 feet. *See* Aneroid.

Altissimo (Ital., very high). In music, the octave above alt. Thus C in altissimo is:—



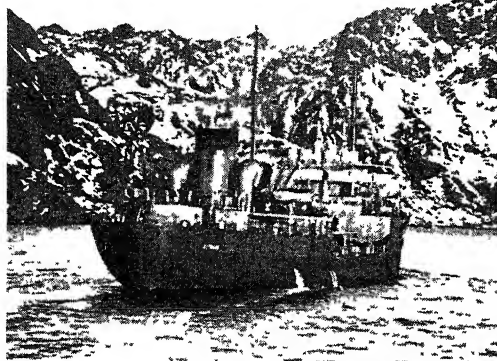
Altitude. In astronomy, the angular height in degrees of a star above the astronomical horizon.

Altkirch. Town in Alsace. It is 17 m. W.N.W. of Basel, on the rly. from Mulhouse to Belfort, has cotton factories and quarries, and trades in grain.

Altmark. German ship of the tanker type. In 1939-40 the Altmark achieved notoriety as a prison ship, satellite of the Admiral Graf Spee (*q.v.*). It was her duty to carry supplies to the Nazi raider, and to take aboard any British survivors of the sinkings. On Dec. 6, 1939, in the S. Atlantic, she relieved the Graf Spee of her last haul of prisoners, and with a total of 299 captives under her hatches headed northwards. Having reached Icelandic waters, she turned south and was sighted off Norway by British aeroplanes on Feb. 16, 1940.

Shortly afterwards the Altmark was intercepted by H.M.S. Intrepid, one of a destroyer flotilla commanded by Capt. Vian of the Cossack, and the British Admiralty ordered that the British ships should enter neutral waters, search the Altmark, and rescue any prisoners found. By this time the German ship, escorted by two Norwegian gunboats, had slipped into Joessing Fjord, a small inlet with a dead end, S. of Egersund. Capt. Vian, in the Cossack, reached the mouth of the fjord, where the destroyer Ivanhoe was standing by, and was here assured by the captain of one of the gunboats that the Altmark was unarmed, had been searched at Bergen, had no prisoners, and had permission to use Norwegian territorial waters.

The British destroyers withdrew, but acting under further Admiralty orders, Cossack re-entered the fjord after dark. By skilful



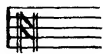
Altmark. German prison ship cornered in Joessing Fjord. She was identified by the single large funnel aft

handling the Cossack was grappled to the Altmark and a party of two officers and 30 men, leaping on to the enemy deck, drove the German crew before them. There ensued hand-to-hand fighting, in which seven Germans were killed and seven wounded. Meanwhile, the prisoners had been located in locked shell-rooms, store-rooms, and even in an empty oil tank. They were released to the stirring reassurance: "The Navy's here!" and, being taken aboard the Cossack, were landed the following day at Leith.

Altmühl (Ger., old mill). River of Bavaria. Rising 7 m. N. of Rothenburg, after a S. and E. course of about 105 m. it joins the Danube at Kelheim. With the Regnitz and the Ludwigskanal it is part of the waterways linking the Rhine and Danube.

Alto (Ital., high). Musical term used to describe a high male voice, sometimes called counter-tenor. Also the French term for the viola or tenor violin in the string quartet and orchestra. See *Contralto*.

Alto Clef. In music, the C clef used on the middle line of a five-lined staff.



Alton. An urban district and market town of Hampshire, England. It lies 46 m. S.W. from London by railway, and is the centre of a hop-growing and agricultural district celebrated for its ale. The perpendicular church of S. Lawrence suffered in the Civil War and was restored in 1867. The assembly hall, built at a cost of £5,000, was presented to the town in March, 1919, as a victory gift. At Chawton, 1 m. S., Jane Austen lived for eight years. A notable local institution is the Lord Mayor Treloar Cripples' Hospital and College

many manufactures and exports coal, stone, lime, and fruit. Pop. 31,255.

Altona. Town and port in the state of Hamburg, Germany. It is on the Elbe, 13 m. W. by N. of Hamburg, in whose commercial prosperity it shared before the Second Great War. Its extensive docks are included, with those of Harburg-Wilhelmsburg, in the port of Hamburg (*q.v.*) The industries included shipbuilding, iron-founding, brewing, and woollen, flour, tobacco, soap, margarine, chemicals, and glass manufactures.

Alton Locke. Novel by Charles Kingsley, published in 1849 with the title of *Alton Locke, Tailor and Poet*; an Autobiography. Although written with the definite purpose of drawing attention to certain social evils, and less well knit as a story than others of his novels, it remains in some respects Kingsley's finest work in fiction. It was one of the early, and remains one of the outstanding, social studies in fiction form.

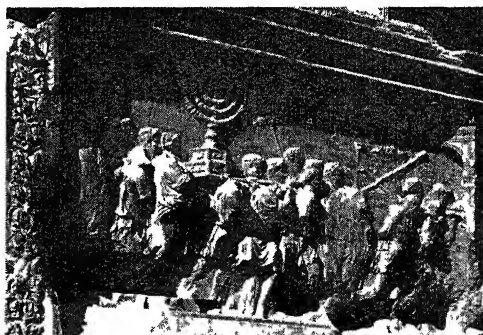
Alton Towers. Seat of the earls of Shrewsbury until 1924, now a popular resort. It is at Alton, Staffordshire, England, about 4 m. E.S.E. of Cheadle. The mansion, dating from 1814, was built by the 15th earl, and the magnificent grounds were laid out by Lancelot ("Capability") Brown (*q.v.*). Terrace below

terrace, they stretch to the river Churnet, with temples, grottoes, fountains, and conservatories.

Altoona. City of Blair co., Pennsylvania, U.S.A. It lies at the base of the Allegheny Mts., 115 m. E. of Pittsburgh, on the Pennsylvania Railroad, and is the site of a school of instruction and important locomotive and carriage works belonging to the Pennsylvania Railroad Co. The rly. passing W. from Altoona ascends the Horseshoe Bend in crossing the mts. Pop. 80,214.

Another Altoona, sometimes called Allatoona, is a pass in Georgia, where on Oct. 5, 1864, a battle of the American Civil War was fought. The Federals had here a great store of bread, which the Confederates determined to seize. The former held the place for six hours, when the Confederates withdrew. See *American Civil War*.

Alto Relievo (Ital. *alto-rilievo*, high relief). In art, a term signifying high relief as distinguished from low and middle, according to the degree of elevation from the flat. The term is mainly used of sculpture and carving, but may be applied to other branches of art. In high relief the figures or



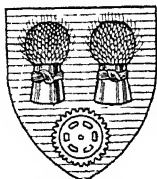
Alto Relievo. Panel from the Arch of Titus, Rome, showing Roman soldiers laden with the spoils of Jerusalem. It is a fine example of sculpture in high relief

other parts of the design stand out conspicuously.

Altötting. Town of Bavaria. It is 60 m. by rly. E.N.E. of Munich, and has an old chapel with an 8th century black image of the Virgin Mary, which attracts thousands of pilgrims yearly. In the chapel of SS. Peter and Paul is the tomb of the great German commander, Tilly (1559-1632).

Altranstädt. Village of Saxony. It stands between Merseburg and Leipzig. Here, on Sept. 24, 1706, peace was made between the victorious Charles XII of Sweden and Augustus of Saxony and Poland.

Altrincham. Mun. bor. of Cheshire, England, 8 m. S.W. of Manchester, and served by railways, including the former Manchester S. Junct. and Altrincham rlys. The town is mainly residential and industrial, as well as being an important market-garden centre. A charter naming Altrincham as a free borough was granted in 1290, and a record of mayors since 1452 has been kept. It was incorporated as a mun. bor. in 1937. There are generous open spaces and excellent parks and a municipal golf course. Altrincham and Sale form a county division returning one member to Parliament. Market days, Tues. and Sat. Pop. 39,000 approx.



Altrincham arms

Altruism (Lat. *alter*, another). All action, to quote Herbert Spencer, which in the normal course of things benefits others instead of benefiting self: the opposite of egoism. To live for oneself is the principle of egoism, to live for others the principle of altruism. The term originated with the French Positivist Auguste Comte, who considered altruism to be the indispensable condition of all culture and morality. See Egoism.

Altstätten. Town of Switzerland in St. Gall canton. It is 15 m. S.S.E. of Rorschach, 1,700 ft. high, and has sulphur springs.

Altun Keupri (the Golden Bridge). Ancient town of Irak. Situated on an island in the Lesser Zab river, it is 25 m. N. of Kirkuk. British forces of the First Great War, in their great pursuit of the Turks, drove them across the river here, May 11, 1918.

Altyn-tagh. Range of mts. in Central Asia. It forms in part the boundary between Tibet and Sinkiang. The highest ascertained alt. is 14,000 ft. In this range the wild camel is found.

Aludel (Arab., utensil). Vessel of earthenware or glass formerly used for condensation. Externally



Aludel. Series of three of these earthenware vessels used by old-time alchemists

its shape is similar to that of an Indian club as used in gymnastic exercises. An ancient piece of chemical apparatus, it will be found illustrated in most pictures of alchemists' laboratories. Its

purpose is to condense, on the inside, metallic fumes, produced in the process of distilling the more volatile metals out of their ores. It is used in series as shown in the illustration, between 500 and 600 vessels being connected with one furnace. It has been largely superseded by more efficient apparatus, but is understood to be still used in old works in Spain. See Mercury.

Alum (Lat. *alumen*). White transparent mineral salt consisting of the double sulphate of aluminium and potassium with water of crystallisation ($\text{Al}_2(\text{SO}_4)_3 + \text{K}_2\text{SO}_4 + 24 \text{H}_2\text{O}$). This is the typical alum, but the term is extended to a series of double sulphates of the same general formula. There are, for instance, alums similar to potash alum, except that the potassium is replaced by ammonia, soda, or silver, these being known as ammonia alum, etc. On the other hand, a series exists of double sulphates, also known as alums, which contain no aluminium. Examples of these are iron alum, manganese alum, and chrome alum.

Pliny and Dioscorides describe the varieties and uses of alum. In the 15th century Pope Pius II carried on a famous alum factory at Tolfa, near Civita-Vecchia, Italy, alunite or rock alum being the raw material. Roman alum, or roche alum, is still asked for when a pure alum is desired. The manufacture of alum was introduced into England in the 18th century by Challoner, who discovered a suitable aluminous deposit at Guisborough, Yorkshire.

The raw materials from which alum is made are alunite, otherwise known as alum stone, found chiefly at Tolfa and Solfatara, in Italy, and Puy de Garcey, Auvergne, France; alum shale and alum schist, found at Whitby, Yorkshire, Campsie, Scotland, and other parts of the world; bauxite, and cryolite. The original methods of making alum consisted of weathering the alum stone, burning it in heaps, and then lixiviating the product with water from which the alum crystallised. The modern process is to calcine the alunite at a high temperature and treat the product with sulphuric acid, when both aluminium sulphate and alum result, these being separated from each other by crystallisation; or the whole is converted into alum by adding sufficient potassium sulphate. When potash alum is strongly heated the water of crystallisation

is thrown off, and the product swells up and produces burnt alum. Potash alum only was at first produced, but in 1845 Spence introduced the manufacture of ammonia alum from the refuse shale underlying the coal seams of South Lancashire, Scotland, and elsewhere. One ton of ammonia alum is produced from 15 cwt. of shale. Alum is also made from aluminium sulphate derived from bauxite or china clay.

Ordinary alum is much used for its astringent or drying properties. The largest industrial use of alum is in dyeing, as a mordant or fixer of the colours to the fabric. It must be free from iron. Combined with acetic acid, it forms the red liquor of the dyer. A great variety of solid colours known as lake pigments is made, in which alum is required as the base. It is also used in making shower-proof garments; as a fireproof filling for safes; for fireproofing fabrics and wood; for hardening plaster of Paris; in tawing leather; for sewage purification, and for softening water. In medical practice, alum is frequently used as a mild caustic and astringent.

Alum - bagh. Palace within walled grounds, 4 m. to the south of Lucknow, India. It was converted into a fort by Sepoys in the Mutiny. Their position, which rested on Alum-bagh, was stormed and captured, Sept. 23, 1857. In Nov., 1857, Havelock was buried within the fort, which was held by Outram against the Sepoys until its relief by Sir Colin Campbell, March, 1858.

Alum Bay. Beach at the extreme W. of the Isle of Wight, England, bounded by Hatherwood Point and the Needles (*q.v.*). The cliffs are famous for the multi-coloured strips of sandstone which contrast with the basic white of the chalk. Bagshot beds (*q.v.*) are exposed here.

Alumina. An earthy mineral, chemically an oxide of aluminium (sesquioxide), its formula being Al_2O_3 . It is perhaps the most abundant and widely distributed of the earths. In combination with silica it forms clay; the compound, though commonly reddish owing to the presence of iron, is white when pure, as in china clay used for the production of porcelain. It constitutes a large proportion of slate and of all slaty rocks and shales.

Alumina is derived from the granite rocks, where it is present in combination with silica and potash in the form of feldspar. It is by

the decomposition of the feldspar of granite that the clays and argillaceous soils and rocks have been formed. It occurs in a pure state in the crust of the earth in the forms of the ruby, sapphire, Oriental topaz, amethyst, and other gems, and as bauxite (*q.v.*), principal source of aluminium, corundum, and emery.

When it is precipitated from its solutions, pure alumina is a white, bulky, and amorphous powder. The precipitate possesses a specific gravity of 2.00, though when fused the specific gravity rises to nearly double. It is insoluble in water, but dissolves in most acids and in solutions of caustic soda and caustic potash. It is infusible at ordinary furnace temperatures, but melts under the oxy-hydrogen blowpipe and in the electric arc. The crystalline form is not soluble in acids.

Artificial rubies and sapphires are made by fusing alumina with the appropriate colouring element at very high temperatures. A pure form of alumina is made by strongly heating ammonia alum. Corundum is made artificially by fusing alumina in the electric furnace and allowing the fused mass to cool slowly. Aluminates are formed by the action of alkalis on alumina.

Aluminium (Lat. *alumen*, alum). Aluminium (in America aluminum) occurs in nature only in combined form, chiefly as the silicate (clay, feldspar, etc.) and the oxide and hydroxide (corundum and bauxite). Cryolite, the double fluoride of aluminium and sodium, occurs only in Greenland, but can be produced synthetically. It has been estimated that the earth's crust contains about 8 p.c. of metallic aluminium in combined form, this amount being exceeded only by silicon. Bauxite (*q.v.*) ore is the principal source of supply of the metal, as it is more easily extracted from the hydroxide than from the silicate, but other ores have been used in countries situated far from bauxite deposits, particularly in war-time.

Aluminium (chemical formula Al) has an atomic weight of 26.97 and a specific gravity of about 2.7 in the pure cast state at room temperature, with a melting point of 660° C. approx. Alloying with heavier metals increases the specific gravity slightly and reduces the melting temperature. The thermal conductivity is about half that of silver, and the electrical conductivity about 60 p.c. of that of copper. The specific heat is

very high and exceeded only by magnesium. Commercially pure aluminium, produced by the electrolytic process, has a purity of 99.5 p.c. plus, the chief impurities being silicon and iron, while super-purity aluminium, produced on an industrial scale by double electrolysis, has a purity approaching 99.99 p.c.

Properties of Aluminium

Aluminium, in both pure and alloyed form, is white with a bluish tinge; it has a high affinity for oxygen which results in the immediate formation of a thin transparent film of oxide on the surface when exposed to the atmosphere, which prevents tarnishing and protects the metal from any but strong oxidising agents. This film can be thickened by anodic treatment and such films can be dyed to give permanent decorative effects. The metal is extremely ductile, particularly in the form of annealed sheet, and it can be rolled into thin foil, drawn into fine wire, and pressed into intricate shapes, being exceeded in this respect only by gold. Many of its alloys can be extruded under pressure and temperature to produce long lengths of sections of almost any shape and size.

HISTORICAL. Some controversy has arisen over the exact date when metallic aluminium was first isolated, but it is now generally agreed that it was in 1845 that the German scientist Wöhler, at the university of Göttingen, first succeeded in producing particles of sufficient size to recognize as metal and in sufficient purity to determine its chief properties, using a process based upon the reduction of aluminium chloride with potassium. Nine years later, in 1854, the French chemist H. Sainte-Claire Deville improved upon this process by substituting sodium for potassium, which reduced the cost, while the double chloride thus formed acted as a flux and allowed the metallic globules as formed to coalesce and be cast into ingots. This process, or modifications of it, remained the basis of all the early production of the metal until the simultaneous discovery of the modern electrolytic process in America by Hall and in France by Héroult in 1886. This process depends upon the electrolytic reduction of pure alumina dissolved in a molten bath of cryolite (double fluoride of aluminium and sodium), using carbon anodes and cathodes, the carbon of the anodes being the

actual reducing agent consumed. This process, with slight modifications, is the basis of the modern aluminium industry. The first plant to use it was operated in 1887 in the U.S.A. by the Cowles Electric Smelting and Aluminium Co., and the first in Europe by the Soc. Métallurgique, later in 1887, at Neuhausen in Switzerland. The first use of the process in Great Britain was made in 1890 by the Metal Reduction Syndicate at Patricroft, near Manchester, on a small scale. In 1896 it was developed by the British Aluminium Co. at Foyers, Scotland, on an industrial scale.

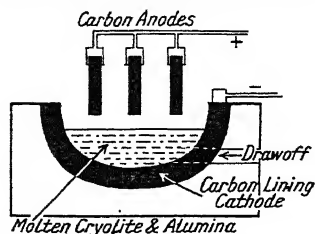
MODERN METHODS. The process now universally employed in the aluminium industry is a two-stage one, the chemical extraction of pure alumina from its ore, followed by reduction of the alumina to metallic aluminium in the electric furnace. The first stage, being a purely chemical process involving considerable quantities of heat, is preferably located in proximity to a cheap source of fuel such as a coal mine, while the second stage demands ample supplies of cheap power, which normally means water power. About four tons of bauxite containing 60 p.c. of aluminium oxide (Al_2O_3), or alumina, is required to produce the two tons of alumina needed for one ton of aluminium.

The Bayer Process

The original Bayer process of producing alumina is still the principal one employed. The bauxite, after grinding, is treated under pressure and temperature with strong caustic soda to form a supersaturated solution of alumina in sodium aluminate, with a residue containing the unattacked impurities, chiefly silica, iron, and titanium, with some alumina and soda combined with the silica in the form of insoluble sodium-aluminium-silicate. This loss of alumina and soda to the silica necessitates the use of bauxites low in silica rather than low in iron. After filtering to remove the impurities the sodium aluminate is diluted and run into decomposers where most of the alumina is precipitated as tri-hydrate, which is subsequently calcined at high temperature to the non-hygroscopic form of alumina for feeding to the reduction furnace.

The modern reduction furnace is made of sheet steel lined with carbon which acts as cathode, with carbon anodes suspended from supports and dipping into

the molten bath of cryolite containing about 5 p.c. of alumina. The voltage per cell is 5-7 volts and is so adjusted that under normal working conditions only the alumina is decomposed, though in practice there is an unavoidable small loss of cryolite. A covering of alumina



Aluminium. Diagrammatic section of a reduction furnace, showing arrangement of anodes and cathode

is maintained at the top of the furnace, which is replaced as it becomes dissolved and used up, and the anodes are also lowered periodically as they become consumed. The oxygen of the alumina combines with the carbon of the anodes to form carbon monoxide, which burns to carbon dioxide and escapes, while the molten aluminium thus released falls to the bottom of the furnace and is tapped off.

The carbon required to reduce aluminium oxide to aluminium is supplied by the material of the anode and any impurities in the raw material will find their way into the metal; the leading producers therefore make their own electrodes from special grades of coke. Natural cryolite is found in only one place, Greenland, but can be produced synthetically, and the leading firms have their own plants, if only as a safeguard against interruption of supplies, particularly in war.

USES OF ALUMINIUM. Aluminium, like most pure non-ferrous metals, has relatively poor mechanical properties, though these can be somewhat improved by cold work—rolling, drawing, and pressing. In general, therefore, the pure metal is used for purposes where its chemical and physical properties are of value, chiefly its resistance to corrosion, high thermal and electrical conductivity, light and heat reflectivity, and its affinity for oxygen. When alloyed with other metals, the mechanical properties are very markedly raised, and the alloys therefore find their chief use in fields where light weight combined with high strength is desired, fore-

most among which is the transport industry.

A large number of light alloys have in recent years been developed with characteristics to suit various applications, and most of these are covered by British Standards Institution or Department of Technical Development (Air Ministry) Specifications in Britain. The more important of these are known also by their trade names, such as Duralumin, Silumin or Alpac, Hiduminium, Birmabright, Wilmil, etc., containing varying proportions of different alloying elements, chief among which are magnesium, manganese, copper, zinc, nickel, and silicon. As far and away the highest consumption of aluminium today is in alloyed form, the generic term aluminium is usually taken to cover its alloys.

As the aluminium industry is a new one and new uses are being continually found for the metal, it is difficult to give any but a rough idea of its principal applications, but the following general notes may act as a guide.

Transport. In motor transport the metal is used in the form of castings for engine crank-cases, cylinders and pistons, gear boxes, and numberless fittings, and in sheet form for body work in cars and buses, and for delivery vans. In the aircraft industry the high-strength structural alloys in fabricated form find their chief uses, modern military and transport planes containing upwards of 80 p.c. of light alloys. There is also an increasing use in naval vessels of all kinds, particularly high-speed craft, and much of the superstructure of modern liners is in light metal. Special alloys to resist saline conditions have been developed for this purpose.

Domestic. Aluminium cooking utensils utilise the good heat conductivity and hygienic qualities of the metal and the modern trend for prefabricated kitchens involves extensive use of aluminium. Most food-processing trades use aluminium equipment, and aluminium vessels are used in both process

and transport in the dairy and brewery industries.

Electrical. In this field aluminium competes with copper for almost every purpose, the use of one or the other depending mainly upon the relative prices of the two metals—when aluminium is less than twice the price of copper it can in general compete. The biggest uses are for bus-bars and overhead transmission lines, but anodically insulated aluminium wires are also used for magnet windings.

Machinery. There is a somewhat limited but increasing use of aluminium for machines of all kinds, chiefly portable tools and transportable machinery, where weight reduction is desirable.

Building. Anodised and coloured window frames, panels, handrails, handles, and a host of fittings are made of aluminium, and complete prefabricated houses of aluminium have been built. Aluminium foil (Alfol) is also used for insulation and aluminium powder for paint.

Chemical. Large vessels, welded out of aluminium sheet, are used in chemical plant of all kinds.

Metallurgical. Aluminium is used as a deoxidising agent for steel and some non-ferrous metals and as a grain-refining agent in certain classes of steel. It is also used in the aluminothermic reduction process for the production of carbon-free ferro-alloys.

Miscellaneous. Among miscellaneous applications may be mentioned condensers and earthing shields in wireless equipment, parts of cameras, field glasses and scientific instruments, and military equipment of all kinds where light weight is of importance.

HEAT-TREATED ALLOYS. Most modern aluminium alloys owe their mechanical properties, high strength combined with good ductility, to some form of heat treatment, involving in many cases the phenomenon known as age-hardening, which was discovered by the German Wilm in 1908 and led to the development of the Duralumin series of structural alloys. This involves heating to about 500° C., quenching

WORLD PRODUCTION OF ALUMINIUM (in thousands of tons)

Country	1910	1920	1930	1938	1943
France	6.0	12.0	26.0	45.0	60.0
Switzerland	10.0	13.0	20.5	27.0	30.0
Germany and Austria	4.5	12.0	33.5	165.5	350.0
Norway	1.0	5.0	27.5	30.0	25.0
Great Britain	5.5	8.0	15.0	23.5	50.0
Russia	—	—	—	45.0	100.0
Other European	—	—	8.5	31.5	60.0
U.S.A.	17.5	90.0	104.0	130.0	900.0
Canada	4.5	10.0	35.0	66.0	450.0
Japan	—	—	—	17.0	100.0
World	49.0	150.0	270.0	580.5	2,125.0

in water, and allowing to stand for several days, during which the full strength is developed. This phenomenon is more or less peculiar to light alloys—aluminium and magnesium.

Bibliography. De l'Aluminium, Sainte-Claire Deville, 1859; Aluminium, its History, etc., Richards, 1896; The Metallurgy of Aluminium, Anderson, 1924; The Aluminium Industry, Edwards, Frary, and Jeffries, 1930; The Technology of Aluminium, 1938; 100 Years of Aluminium, Freeman Horn—Metallurgia, Feb., 1945. For Light Alloys consult Reports of Alloys Research Committee of Inst. Mech. Eng., 1907–1921, and Journal of Institute of Metals, 1920–1945.

Freeman Horn

Aluminium Bronze. Alloy of copper with up to 14 p.c. of aluminium, usually 10 p.c., and small additions of other metals to give special properties or to improve working qualities. The mechanical properties are comparable with steel and can be varied over a wide range by adjustment of composition, by degree of working, and by heat treatment. The alloy is highly resistant to attack by most corrosive media, including mineral acids. This is attributed to the formation of a protective film of aluminium oxide on the surface under service conditions. It is extremely hard, and both hardness and strength are maintained to a marked degree at high temperatures. The pleasing appearance, akin to that of gold, is made use of for architectural purposes and for imitation jewelry. The most important uses are in marine engineering (e.g. ships' propellers) and for the parts of acid pumps and other plant. It is also used for the valve seats and guides of internal combustion engines, for sparking-plug bodies, and for heavy-duty bearings and gear wheels. The extreme hardness makes it useful in non-sparking tools, though beryllium bronze is beginning to supplant it for this purpose. It may be cast, forged, rolled in sheet or drawn as wire. The standard 10 p.c. alloy has a specific gravity of 7.5 and a melting point of approx. 1,000° C. The tensile strength of castings varies between 20 and 30 tons per sq. in., and of sheet between 30 and 35 tons per sq. in., according to composition and heat treatment. Cold-drawn wire and sections can be supplied with tensile strengths up to 60 tons per sq. in.

In France and the U.S.A. considerably more use has been made

of aluminium bronze than in Great Britain, though most of the early development work was carried out in this country. The electrical conductivity of aluminium bronze, though low compared with that of copper and aluminium, is materially higher than that of any ferrous alloys with comparable strength.

Aluminium bronze was produced direct in the electrolytic furnace by the Cowper-Cowles process before aluminium was thus produced.

Aluminium Salts. Three hydrated oxides are known, and of these the native forms diaspore and bauxite are the most important, being the source whence other salts of aluminium are prepared. Alumina (*q.v.*) forms with sodium and potassium hydroxide the salts known as aluminates. Sodium aluminate, NaAlO_2 , is prepared from the solution obtained in the alkaline extraction of bauxite. It is used in dyeing and calico printing.

Aluminium chloride, AlCl_3 , is a white crystalline solid now made on a large scale from bauxite, coal, and chlorine. It is largely employed in preparing organic compounds and as an antiseptic and astringent. Aluminium bromide and iodide also find uses in organic chemistry. Aluminium sulphate occurs native and is also made from bauxite and china clay. A special grade is supplied for water purification purposes.

Alum Root (*Heuchera americana*). Perennial herb of the large family Saxifragaceae. A native of North America, it has clammy, hairy stems, and long stalked, lobed and toothed, roundish leaves. The reddish flowers form a lengthened cluster. The root is very astringent; hence the name. The name is also applied to the spotted crane's-bill (*Geranium maculatum*), a N. American herb with roots so astringent that they are used instead of kino (*q.v.*).

Aluta, ALT or OLTU. Tributary of the Danube. Rising in Transylvania, on the N.W. slope of the Carpathians, it flows through the Roter Turm pass into Rumania, goes through Wallachia, and finally enters the Danube opposite Nikopolis. Its length is about 315 m. and it is too rapid for navigation. The upper portion of the valley is the home of the Szeklers, a people akin to the Magyars. Heavy fighting between Rumanian and German forces took place in the valley in the autumn of 1916. See Rumania.

Alva. Police burgh of Clackmannanshire, Scotland. It stands under the Ochil Hills, 7 m. E.N.E. of Stirling by the L.N.E.R., and has large woollen factories, and specialises in tartans, shawls, and tweeds. Bricks are manufactured. Close by is the Alva Glen, noted for its waterfall. Pop. 4,853.

Alva, FERNANDO ALVAREZ DE TOLEDO, DUKE OF (1508–83). Spanish soldier. He became a soldier when very young, and



Duke of Alva. Spanish soldier, governor of the Netherlands under Philip II
Antonio Moro

showed marked ability and courage in the early wars of the Emperor Charles V. Later he was made commander-in-chief in Italy, but it was not until he was sixty that he entered upon the work which gave his name its prominence.

In 1567 Philip II of Spain appointed Alva to the governorship of the Netherlands, which were seething with revolt—partly political, against the subversion of their constitutional liberties; partly religious, against the stern tyranny of the Inquisition. Alva, a capable soldier, had only one idea of government, to crush every form of opposition by force of arms. His immediate appointment of an arbitrary court of justice and the sternness of its procedure at once kindled open rebellion. In 1568 a detachment of Alva's Spaniards was defeated by a force of the insurgents at Heiligerlee. Alva at once seized and executed Count Egmont and Admiral Horn, leaders who had endeavoured to check the outbreak of violence.

Then he himself took the field, and a reign of terror began. He showed his political incapacity by imposing taxes which would have ruined the commerce of the Netherlands and destroyed

the great wealth wherein lay their value to his master. Not until the trade of the Netherlands was on the brink of destruction were these taxes abandoned. Alva believed that the Netherlands were helpless and that revolt had been crushed, when suddenly in 1572 it again blazed out. The towns of the northern provinces closed their gates to the Spaniards; in the S. the insurgents captured Mons. Though Mons itself and other towns in succession were compelled to surrender, Alkmaar held out defiantly and the Spaniards were obliged to retreat.

Alva, now conscious that victory won by force would be barren, urged his own recall, and in 1573 his place was taken by the more politic Requesens. Alva went into retirement, from which he emerged in 1580 to compel the submission of Portugal to Philip. He died at Thomar, Jan. 12, 1583. The 17th duke of Alba (*q.v.*), Spanish ambassador to Great Britain 1939-45, was a direct descendant. *Consult* Rise of the Dutch Republic, J. L. Motley, 1856.

Alvarado. Seaport of Mexico. It stands on the Bay of Campeche, at the mouth of the Alvarado river, 38 m. by rly. S.E. of Vera Cruz. Pop. 8,000.

Alvarado, PEDRO DE (c. 1495-1541). Spanish soldier and adventurer. Born at Badajoz, in early life he went to America, and in 1519 was one of the leaders in the expedition under Hernando Cortes for the conquest of Mexico. He remained there as governor after the conquest, and later became governor of Guatemala.

Alverstoke. Seaside resort of Hampshire, England, 1 m. S.W. of Gosport, between the Solent, Spithead, and Haslar Lake. Originally intended as a spa, it has some Georgian architecture and has been a favourite place of residence for naval men. There are fortifications in the district, and eastward is Haslar naval hospital, built 1746-62, with accommodation for nearly 2,000.

Alverstone, RICHARD EVERARD WEBSTER, VISCOUNT (1842-1915). British lawyer and politician. A son of Thomas Webster, Q.C., he was born Dec. 22, 1842, and educated at Charterhouse and Trinity College, Cambridge. In 1868 he became a barrister, and in ten years a Q.C. In 1885 he entered the House of Commons as M.P. for Launceston, and was attorney-general in the short-lived Conservative government of that year. He held the same

position from 1886-92 and from 1895-1900, during which years he represented the Isle of Wight. In 1900 he was made Master of the Rolls, but on the death of Lord Russell of Killowen in that year was transferred to the Lord Chief Justiceship, which he retained until 1913. He died Dec. 15, 1915, and, as his only son predeceased him, his barony, dating from 1900, and viscounty, dating from 1913, became extinct.

He conducted the case for The Times before the Parnell Commission, and he represented Britain in the Bering Sea and Venezuela arbitrations. In 1903 he was president of the court appointed to decide the boundaries of Alaska.

Alves, FRANCISCO DE PAULA RODRIGUES (1848-1919). President of Brazil. Born in São Paulo, he was a deputy under the Empire. He was president of São Paulo, 1898, of the United States of Brazil from 1902-6 and 1912-16, and was again elected president March 3, 1918, but resigned in the following Nov. through ill-health. The first to be elected president twice, he was largely responsible for stamping out yellow fever and effected important improvements in the city of Rio de Janeiro, where he died, Jan. 15, 1919.

Alvinczy OR ALVINZI, JOSEPH, BARON VON (1735-1810). Austrian soldier. His first experiences of warfare were gained during the Seven Years' War. From 1790-3 he served in the Netherlands, and in 1796 was chosen to lead the Austrian army in Italy, where Napoleon defeated him at Arcola in 1796 and at Rivoli in 1797. In 1808 he was made a field-marshal. He died Nov. 25, 1810.

Alwar. State of Greater Rajasthan, India. It was founded in 1775 by Pratap Singh from estates in Jaipur territory, and attained its present dimensions of 3,158 sq. m. under his successor, who supported the British in the Mahratta War in 1803. Millet, gram, barley, cotton, and wheat are produced; copper, iron, lead, and marble are worked, and weaving and paper-making are carried on. The vernaculars are Rajasthani and W. Hindi. Pop. 823,055.

Alwar. Capital of Alwar state, Rajasthan, India. Situated on the Rajputana-Malwa rly., 98 m. S.W. of Delhi, it is built on rising

ground, its walls are pierced by five gateways, and it is dominated by a fort placed on a conical rock 900 ft. high. Its buildings include the royal palace, a jewel house and armoury, the mausoleum of Bakh-tawar Singh, the tomb of Fateh Jang, and several large mosques. Pop. 44,760.

Alyth. Town and police burgh of Perthshire, Scotland. It is 23 m. N.W. of Dundee, with a rly. station, and has manufactures of woollens, linen, and jute. In the neighbourhood are the remains of a British camp. Pop. 2,629.

Amadavat (*Estrelida amadava*). Bird of the family Ploceidae (Weaver-birds) of the order Passeriformes. It is a native of E. Asia, and is sometimes called avadavat. It is a seed-eater, with a conical beak like that of a sparrow, but of blood-red colour. In the mature male, the head and underparts are bright crimson dotted with white. The feathers of the back are dark grey margined with red and tipped with white. The female, which is considerably smaller, is grey, dotted with white; pale sulphur-coloured beneath. It is extensively kept as a cage bird on account of its fine colour and pleasant trilling song.

Amade, ALBERT GERARD LEO D' (1856-1941). French soldier. The son of Adolphe d'Amade, military intendant, he was born at Toulouse, Dec. 24, 1856, and was educated at La Flèche and at the lycée of Lorient, Morbihan. He entered the French army as a lieutenant of Algerian infantry at Constantine, Oct. 1, 1876. Military attaché at Peking, 1887-91, and military attaché with British Headquarters in the S. African War, he was promoted colonel in 1903 and was military attaché in London, 1903-6. Advanced to the rank of general in 1907, he commanded the French forces in the operations in Morocco, 1907-9. In 1914 he became a member of the Conseil Supérieur de la Guerre, and on the outbreak of the First Great War was in charge of the mobilisation of the Army of the Alps. Later he commanded a group of territorial divisions operating in the N. of France. In April-May, 1915, he led the French troops in Gallipoli. He died Nov. 11, 1941.

Amadeus. Salt lake in the S.W. of Northern Territory, Australia. Except on rare occasions there is nothing but a thin crust, about half an inch of salt, in the lake bed, which is about 200 m. long and of varying width. It was discovered in 1872 by Ernest Giles.



Alves
Elliott & Fry

Amadeus (Lat. *amare*, to love; *Deus*, God). Christian name. In its Italian form of Amadeo, it has been borne by many counts of Savoy. In English it is represented by the now rare Amyas or Amias; in French, by Amédée.

Amadis of Gaul. Hero of ancient romance, and title of one of the most famous romances of chivalry in which he mainly figures. The authorship is generally credited to Vasco Lobeira (d. 1325), who is said to have written the first four books of the work in Spanish, the other eight books being added by later writers. The work was re-shaped at the end of the 15th century by Ordoñez de Montalvo. Some authorities believe that Lobeira took his theme from a lost French original.

The story may be summed up as a brilliant imitation of the tales of the Arthurian cycle. Amadis of Gaul was followed by Amadis of Greece and other countries. The romance is purely fictitious. The best English version is by Robert Southey, 3 vol. ed., 1872; abridgments by N. J. Davidson, 1911, and S. R. Littlewood, 1915.

Amager. Island of Denmark. It is separated from Copenhagen on the southern end of Zealand by the Sound. Christianshavn, a suburb of the capital, is in the N. Amager is 9 m. long by 5 m. broad, with an area of about 25 sq. m. Low, flat, and fruitful, with large market gardens, it has several small towns, including Dragør. Pop. 26,000.

Amakuru. River of S. America. Above Issokoro it forms part of the boundary between Venezuela and British Guiana; it enters the sea on the S. shore of the Great Mouth of the Orinoco.

Amaldar (Arab. *amal*, office; Pers. *dar*, holder). Indian term for the holder of any post or office. It is applied, for example, to agents, factors, managers, collectors of revenue, and governors of districts.

Amalekites. Powerful and warlike nomad tribe who contested the passage of the desert south of Canaan with the Israelites (Ex. 17; Num. 14). Intermittent warfare went on for many generations between Israelites and Amalekites, until the latter were finally smitten by the Simeonites under Hezekiah (Judg. 6; 1 Sam. 15; 1 Chr. 4). In Balaam's prophecy (Num. 24) the Amalekites were called the first of the nations. According to Arab tradition they came from the Persian Gulf.

Amalfi. City and seaport of Italy, in Salerno province. Situated on the Gulf of Salerno, 23 m. S.E. of Naples, it is noted for its fine coast scenery and magnificent trees and gardens. Its antiquities include the 11th century cathedral of S. Andrea and a 13th century Capuchin convent. In the Middle Ages it was an important republican centre for eastern trade, giving a code of maritime laws to the Mediterranean traffic. The town was sacked by the Pisans in 1138 and never recovered its maritime importance. Masaniello (1622-47, *q.v.*) was born here. Soap, paper, and macaroni are manufactured. Pop. 7,472.

Amalfi figured in the intense fighting between Allied and German forces that followed the full-scale landings on the beaches at Salerno by the Anglo-U.S. 5th army on Sept. 9, 1943. By Sept. 13 Amalfi marked the western extent of the new Allied front, the eastern extremity being at Eboli. From

this line the German army withdrew, after bitter resistance, in the direction of Naples.

Amalgam. In metallurgy, a mixture or solution of mercury (quicksilver) with another metal. Examples include gold amalgam, silver, copper, and sodium amalgams. The term used by 13th century alchemists was amalgama.

Certain amalgams are of importance in the arts. One of tin and mercury is used for silvering mirrors in proportions of about three of mercury to one of tin; another, for silvering glass balls, contains a little lead and bismuth in addition to tin. Silver amalgams are used for silvering and gold amalgams for gilding; while other uses are found in connexion with the rubbers of frictional electric machines and in electric batteries where zinc plates or rods are amalgamated to prevent too rapid waste. The curious Tree of Diana is formed by mixing mercury with a solution of nitrate of silver in a glass bottle. Most amalgams are loose combinations from which the quicksilver may be easily separated by heat and often largely by simple pressing; others appear to be true chemical compounds.

Two or three native amalgams are known. One of silver occurs in the form of crystals in the quicksilver mines of Moschellandsberg, in Bavaria, its composition being 36 p.c. of silver and 64 p.c. of mercury; another, of somewhat similar character, containing 87 p.c. of silver and 13 p.c. of mercury, is found in the province of Coquimbo, Chile, and one of gold in the platinum regions of British Columbia. See Amalgamation; Metallurgy; Gold; Silver.

Amalgamated Press, THE. The origin of what is now the largest publishing enterprise in the world may be ascribed to the year 1888, when the founder of the firm, Alfred C. Harmsworth (later Viscount Northcliffe), issued the first weekly number of *Answers to Correspondents*. He was soon joined by his brother Harold Harmsworth (later Viscount Rothermere), and within a year *Answers*—the other words having soon disappeared from its title—had achieved an immense circulation. Other periodicals and magazines were launched with no less success, and by 1896 the registered capital of Harmsworth Bros., Ltd., was £1,000,000. The name, Amalgamated Press, was adopted Dec. 1901, and in later years the growth of the business has known no abatement; new fields of journalism have been opened by its enterprise, and all forms of entertaining and



Amalfi. View of the beautiful Italian city on the Gulf of Salerno, south-east of Naples. In the Middle Ages it was a Republic

instructive periodicals issued by The Amalgamated Press have met with the ready approval of the reading public. In 1939, 126 different publications, chiefly weekly journals, were being produced by the firm, their aggregate circulation amounting to many millions, and one or more of these periodicals enters every home in the U.K.

Northcliffe retired as chairman in 1915 and was succeeded by Sir George Sutton, Bart. The Fleetway House was erected in 1912, at a cost of £128,000, to accommodate the ever-growing editorial and commercial staffs. Further expansion has taken place since 1927 with Viscount Camrose as chairman.

In 1926 the periodicals and magazines formerly published by Messrs. Cassell & Co. were acquired, and in 1928, in order to provide additional editorial and business offices, leases were taken of John Carpenter House and Tallis House.

The company controls the Imperial Paper Mills Ltd., at Gravesend, with frontages to the river Thames and quay accommodation for vessels up to 8,000 tons. A large proportion of the supply of raw material, i.e. wood pulp, is ensured by the company's controlling interest in the Gulf Pulp & Paper Co., Clarke City, Quebec, which holds over 1,000 square miles of timber land. In 1938 the company acquired a controlling interest in Kelly's Directories. The old-established fashion-publishing business of Weldon Ltd. was purchased in 1941.

Amalgamation. Process of extracting gold or silver from sands or crushed ore by the aid of mercury. The cyanide processes are now most largely used in the recovery of gold and silver, but amalgamation is combined with,



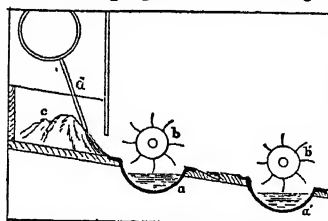
Amalgamation (Fig. 1). Part section of riffled table used in gold extraction

or used in addition to, cyaniding in crushing rock or washing in alluvial deposits. Mercury combines with gold, silver, and other metals in the cold, forming amalgams.

In the recovery of gold from crushed rock by amalgamation mercury is generally put directly into the mortars of the stamp mill, while copper plates, which have been rubbed with quicksilver, are often inserted in the mortars. As the ore becomes sufficiently crushed, it is washed from the mortars by

water and discharged on to inclined tables fitted or formed with riffles, which are essentially ridges running across the table. A partial section of such a table is shown in Fig. 1, which represents the simplest form of amalgamating machine. The upper surface of this table is generally formed of amalgamated copper plates, while free mercury is poured into the riffles. As often as required, the mortar plates and the riffles or tables are changed, and the gold amalgam is removed.

Amalgamation is used later in special machines to recover the gold which has escaped the battery tables. One such special machine, the Attwood, is shown in Fig. 2, *a*, *a'* being troughs containing mercury; *b*, *b'* paddle wheels which revolve so as just to skim the surface of the mercury, *c* a heap of sand or crushed ore, and *d* a pipe which admits of adjustment. This pipe discharges a stream of water, automatically regulated, upon the ore and washes it down upon the mercury in the troughs. As the ore progresses from trough

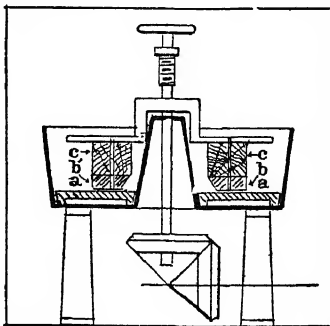


Amalgamation (Fig. 2). Attwood machine, used in recovering gold

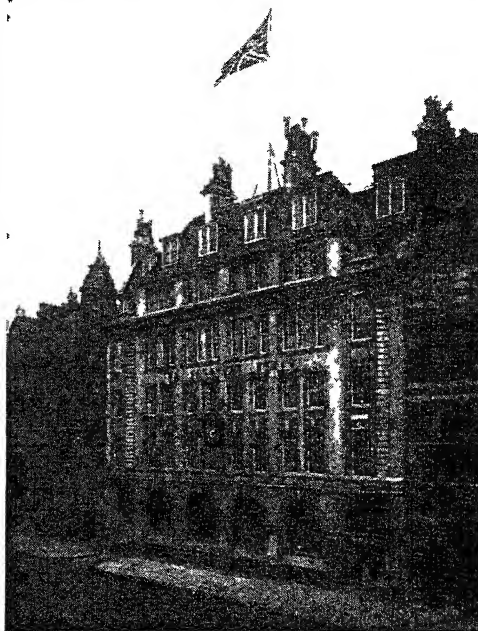
to trough, amalgamation of the gold with the mercury takes place. The gold amalgam formed is removed from time to time and fresh quicksilver introduced.

The essential features of the Knox amalgamating pan are shown in Fig. 3. This pan takes very much the lines of a common mortar mill; *a* being a false bottom fitted into the pan, leaving a partial space between it and the pan bottom proper. Radial grooves are formed on the upper face of this false bottom and filled with

quicksilver; *b*, *b* are iron runners attached through the medium of wooden blocks *c*, *c* to the yoke *d*, by means of which the runners are rotated. The pan is filled up to a certain level with a pulp of crushed ore and water, while quicksilver is added and the runners are set in motion. At the proper moment steam is introduced under the false bottom and the contents of the pan is heated. After thorough incorporation the amalgam formed is run off through an opening in the side of the pan. Finally, the whole contents is discharged for complete separation. The Wheeler pan is an improved form of apparatus on similar lines. Other machines in use are the Molloy hydrogen amalgamator, in which



Amalgamation (Fig. 3). A section of the Knox amalgamating pan



Amalgamated Press headquarters. The Fleetway House, on the east side of Farringdon Street, London

nascent hydrogen is employed to prevent oxidation of the mercury; the Bazin centrifugal pan, and other forms of shaking or rubbing tables. Fine particles of gold which escape amalgamation are extracted by the cyanide process.

The success of the process of amalgamation depends upon maintaining the quicksilver in a clean condition, and chemicals are employed according to the condition and character of the slimes to prevent the fouling of the mercury. The mercury is distilled off from the gold or silver. See Metallurgy; Gold; Silver; Mercury.

Amalia, ANNA (1739-1807). Duchess of Saxe-Weimar. Daughter of Duke Charles of Brunswick-Wolfenbuttel, she became the friend of Goethe, and held a brilliant court at Weimar. In 1756 she married Duke Ernest Augustus of Saxe-Weimar, from whose death in 1758 until 1775 she acted as regent for the young duke, Charles Augustus. Under her rule and that of her son, Weimar was the literary centre of Germany. Consult Life, F. A. Gerard, 1902.

Amaloy. Substitute for platinum, composed of nickel, chromium, tungsten, etc. It is suitable for electrical contacts in railway signals where the voltage is low, and for dental work.

Amals. Leading family among the Ostrogoths, from which their kings were chosen. Theodoric the Great belonged to this line, and the name was attached to several of its members. Consult The Goths, H. Bradley, 1888; Italy and Her Invaders, T. Hodgkins, 1896.

Amalthea. In Greek mythology, daughter of Melisseus, king of Crete. She reared the newly-born Zeus on goat's milk, and as a reward the god gave her the horn of the goat, with the assurance that all her wants should be supplied by it. In another story Amalthea is the Cretan goat itself, which Zeus out of gratitude placed among the

stars. The horn of Amalthea, known as *cornu copiae*, the horn of plenty, as a symbol of abundance and prosperity, frequently appears on coins of the Roman emperors.

Amana. Town of Iowa, U.S.A., 20 m. by rly. S.W. of Cedar Rapids. A German religious community, known as the True Inspiration Society and founded in Württemberg, settled here in 1855.

Amanita (Gr. *amanitai*, fungi). Genus of white-spored agarics distinguished by a sheathed base, and a "ring" or frill just under the cap. With some three exceptions, all are deadly poisonous and are generally responsible for fatal cases of "mushroom" poisoning. The most familiar is probably the fly-agaric (*A. muscaria*), with a vivid scarlet cap covered with white spots, and abundant in birch and pine woods. *A. rubescens* is the only common edible species.

Amann, MAX (b. 1891). German Nazi publisher. Hitler's company sergeant-major in the First Great War, he was made secretary to the Nazi party in 1921, and became one of the most influential Nazi leaders as president of the national Press Chamber. As director of the combine owning most of the party and "acquired" newspapers and periodicals and publishing all books by Hitler and Goebbels, he was in effect Hitler's partner and business manager.

Ama-no-hashidate. One of the most celebrated sights of Japan. It is a sand-bar, similar to the Baltic Nehrungs, completely covered with pine trees, and is a scenic gem when viewed from

the tops of any of the neighbouring hills. The bar separates Iwataki bay from Miyazu bay in the S.W. corner of Wakasa bay, on the Japan Sea. It is about 2 miles in length, with a breadth of 75 yds., is almost 100 miles due north of Osaka, and is reached from that city by rail to Marzura and then by ferry or rickshaw to Miyazu.

Amanullah Khan (b. 1892).

Ameer, later king of Afghanistan. Third son of Ameer Habibullah Khan (*q.v.*), he was born June 1, 1892, and became the legal reigning Ameer on the assassination of his father, Feb. 20, 1919. For a brief period his uncle Nasrulla Khan overthrew the Kabul government and held supreme power, but Amanullah was soon recognized as king. In that year Afghan troops invaded India, and after some fighting Amanullah made overtures to the Indian government, and a peace treaty was signed in Aug. by which Afghanistan became independent. Much interest was created by the prolonged tour of the king and queen of Afghanistan in 1928, in the course of which they visited Egypt, Italy, France, the U.K., Germany, and Russia. His attempts to modernise Afghanistan on the lines of Kemalist Turkey aroused strong opposition, and a conservative revolt aroused by the mullahs forced him to abdicate, Jan. 14, 1929. From India he proceeded to Italy, where he was reported to have become a protégé of the Axis.

Amapala. Free port of Honduras, on the Pacific coast. It is on Tigre Island, in the Gulf of Fonseca, about 950 m. N.W. of Panama. The roadstead was opened in 1868. Exports include silver, coffee, and hides.

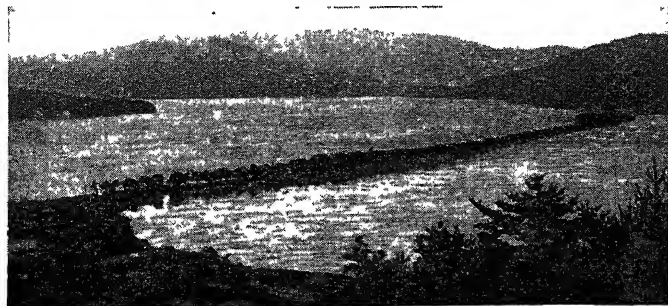
Amara. Town of Iraq. On the Tigris, 130 m. above Basra by the river, it is the largest town between Basra and Bagdad, and gives its name to a district with a pop. of 264,508. Illus., p. 358.

Amara, BATTLE OF. Fought between the British and the Turks, May 31-June 4, 1915. In May, 1915, Gen. Nixon, in command of the Mesopotamia expedition, ordered an advance from Kurna on Amara, the force, which consisted of about 14,000 men, being commanded by Gen. Townshend. On May 31 Townshend attacked the Turks, entrenched on two groups of islands, one 3 m. behind the other, in the Tigris above Kurna. By noon the first group of islands was taken.

When next day the British advanced to the second group of



Amanita. A. virosa, a venomous toadstool



Ama-no-hashidate. This narrow spit of land running into the sea off the coast of Honshu is one of the more famous of Japanese scenic beauties

islands they found the Turks had fled. The flotilla steamed on, but on June 2 the water proved too shallow for the larger vessels. The smaller craft sailed up the river, and on June 3 General Townshend on the Comet, accompanied by three armed tugs, pushed on to Amara, where he surprised and forced 700 Turks to surrender. On June 4 he occupied the town. The British took 1,800 prisoners and 17 guns, and captured or sank several enemy vessels.

Amaranth (Greek *amarantos*, unfading flower). Genus of the family Amaranaceae, consisting of annual herbs found in tropical

high, it is the loftiest summit of the Maiella range of the Apennines.

Amoryllidaceae.

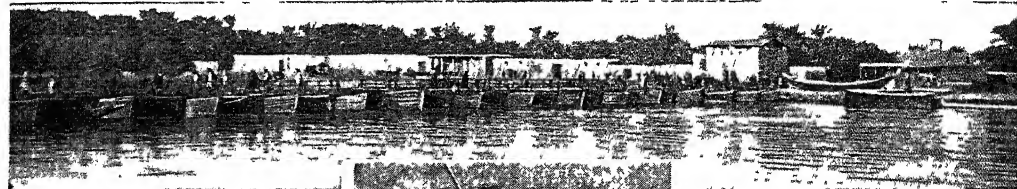


Amoryllidaceae. The wild daffodil

white storage leaves. The flowers, which are borne on leafless stems

important family of flowering plants including more than 60 genera. Many forms are bulbous, the bulb being a shortened stem bearing green foliage and

above the perianth. While a few species, such as the daffodil (*Narcissus*) and snowdrop (*Galanthus*), are common in the N. of Europe, the order is more characteristic of warm and tropical regions, especially of S. Africa. Apart from the species with perennial stems, like Agave (*q.v.*), the period of vegetative and floral activity is brief, and in hot countries follows the rains. During drought the plant is preserved underground in the bulb, which is usually protected against rodents and other enemies by possessing emetic, narcotic, or poisonous properties. Between 600 and 700 species are known.



and warm countries. Individually the flowers are small, but conspicuous by being crowded in long racemes. They have no petals, but the sepals are coloured, and, being of a chaffy consistency, retain their form and colour for a long period, which has made them

popular as garden plants. Love-lies-bleeding (*Amarantus caudatus*), prince's-feather (*A. hypochondriacus*), and *A. tricolor* are familiar ex-



Amaranth

amples, the last with richly variegated leaves of crimson, yellow, and green.

Amarapura, OR THE CITY OF THE GODS. Former capital of Burma. It is on the left bank of the Irawadi, a few miles S.W. of Mandalay. Founded in 1783, of its former prosperity few signs remain. It was the capital 1783-1823 and again from 1837 until it fell into decay under King Mindon, who in 1860 transferred the seat of government to Mandalay.

Amarapura was overrun by the Japanese in their advance through Burma in April, 1942, but was cleared of the invaders by troops of the British 14th army shortly after the heavy fighting for Mandalay had driven the Japanese from this region, in March, 1945.

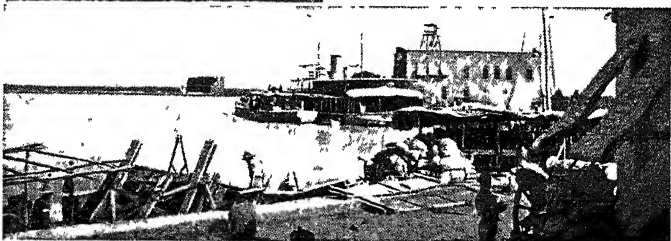
Amaro. Mt. of Italy, S.E. of the Gran Sassa d'Italia, and 9,170 ft.



Amoryllis. Name of a shepherdess in the pastoral poems of Theocritus and Virgil, used generally for a rustic sweetheart or village beauty.

Amasa. Son of Ithra and Abigail, sister of David (2 Sam. 17). He commanded Absalom's army and was defeated by Joab (2 Sam. 18). Pardoned by David, he became successor to Joab, who slew him treacherously (2 Sam. 20).

Amasia, OR AMASYA. Ancient town of Asiatic Turkey, capital of the vilayet of the same name. Situated on the Yeshil-Irmak, it was the residence of the kings of Pontus and the birthplace of the geographer Strabo. It is a terminus of one of the chief roads in Anatolia, by which it is connected through the



Amara, Iraq (p. 357). Wharf showing some of the flat-bottomed river vessels. In centre: Arabs on the Tigris. Top: The bridge of boats across the river

(scapes), are six-partite, with no distinction between sepals and petals. In some respects similar to Liliaceae, there is an obvious difference in the flowers, those of the Amoryllids having the ovary below and those of the lilies having it

coast ranges to Samsun. It has large fruit gardens, orchards, and mulberry plantations, and exports silk, silver, copper, and salt. Pop. (town) 61,000; (vilayet) 136,029.

Amasis. Name of two Egyptian kings. See Aahmes.

Amateur (Lat. *amator*, lover). One who practises or indulges in a sport, pastime, or profession for pleasure and not for monetary gain or consideration. The term is used colloquially for a dabbler, as opposed to earnest worker.

In sport, the amateur is the antithesis of the professional, and the growth of public interest in games led to trouble regarding the status of the two classes. The general tendency was for the professional to oust the amateur, and there was much veiled professionalism. In general, in Great Britain the distinction between amateur and professional is sharply drawn and as sharply maintained. In first-class cricket amateur and professional play in the same team with no further distinction than separate dressing-rooms, sometimes separate entrances to the playing-field, and (until 1946) the use of the amateur's initials on the score card. In Rugby football the amateur, after a bitter struggle, succeeded in keeping the game in his own hands, except in the Rugby League, but in the Association game the amateur has almost disappeared from the leading clubs. In athletics, lawn tennis, rowing, golf, billiards, boxing, etc. amateurs do not compete with professionals. (The open golf championship provides an exception.) In horse-racing gentlemen riders are sometimes granted licences to ride on equal terms with professional jockeys, but they must not receive remuneration. The duty of maintaining the unpaid position of the amateur rests upon the governing bodies of the sports.

In the U.S.A. professionalism is confined almost exclusively to boxing, cycling, wrestling, baseball, lawn tennis, and horse-racing. It was found necessary to prevent freshmen from representing universities, as many men of athletic renown were sent up merely to increase the sporting prestige of the institutions. The line is not drawn quite so strictly in the U.S.A. and in the British dominions as in Great Britain, and occasionally friction has arisen because men regarded as amateurs at home have been considered professionals in England. See Professionalism.

Amateur Athletic Association. The governing body of all amateur athletic sports held in Great Britain. It was inaugurated at Oxford, April 24, 1880, to take over the work which the Amateur Athletic Club, founded in 1866,

had failed to carry out. More than 200 clubs are affiliated, and as many more hold meetings under permits from the governing body and under its regulations. The headquarters are at 118, Chancery Lane, W.C.2. See Athletics.

Amateur Boxing Association. Body founded in 1880 to encourage and control amateur boxing in Britain by the establishment of rules and the promotion of contests. More than 600 affiliated groups exist, and there are large regional areas which practically govern themselves. The headquarters are at 69, Victoria Street, S.W.1.

Amateur Theatre, THE. In England the production and acting of plays by groups or societies of amateurs has long been a popular pastime. That the art flourished as long ago as Shakespeare's day is evident from the picture of the "rude mechanicals" of *A Midsummer Night's Dream*, where Bottom and his companions boisterously rehearse and perform the farcical-tragedy of *Pyramus and Thisbe*. A later age claimed aristocratic devotees of the amateur theatre, a form of acting that grew out of the masque fashionable at court during the reign of James I. Amateur actors from the nobility sometimes took part in professional productions during the 18th century, though this was by no means common, the professional stage being regarded as a place swarming with "vagabonds and adventurers." Jane Austen, in *Mansfield Park*, shows the fashionable type of amateur actor and the kind of plays in which he appeared at the beginning of the 19th century—plays which resembled ambitious charades given in drawing-rooms to an intimate circle of friends.

Love for the art has often been bred in youth through participation in the "school play," traditionally though not invariably consisting of scenes from Shakespeare or Sheridan, classical plays in Latin, or plays in some modern language, thus combining amusement with instruction. Dramatic "readings," first introduced during mid-Victorian times, doubtless provoked interest in actual stage productions. Charles Dickens was an enthusiastic amateur actor, who had a private theatre built in his own home.

In the early years of the present century, amateur societies flourished in most towns of the United Kingdom, but their productions were mostly imitations of popular

professional productions, and usually demanded a certain forbearance on the part of their audiences, though various charitable organizations were able to derive benefit. Between 1919 and 1939, however, the interest in amateur theatricals was greatly extended and strengthened, becoming a self-conscious social movement with a significance of its own chiefly independent of that of the professional stage. The movement spread not only in large towns and cities, where discriminating audiences learned to encourage unusual "non-commercial" productions and different styles of acting, but reached villages and hamlets. Notable work was done by the British Drama League, founded in 1919. The object of this organization was to develop and encourage the art of the theatre in its more serious aspects, and to promote a right relation between the drama and the community. By 1939 some 5,000 dramatic societies were affiliated to the British Drama League. Competitions and summer festivals were held in different parts of the country, towns and villages competing against one another. The Scottish Community Drama Association fulfilled a similar function in Scotland. The National Operatic and Dramatic Association (N.O.D.A.) also did useful work, covering as its name implies, a somewhat wider field. The Village Drama Society was incorporated in the British Drama League in 1931, and the Women's Institutes also took up the cause.

Little Theatres

The Little Theatre movement, which achieved remarkable results, stimulated interest in production and in the quality of plays and acting. Instead of presenting plays which had been commercial successes in the professional theatre, amateur companies selected pieces not commonly seen, and these works were frequently performed in the repertory theatres, where the company was amateur working under the direction of a professional producer.

The large cities such as Birmingham, Leeds, Bradford, Manchester, Liverpool, Bristol, and Hull, claimed a high percentage of these amateur companies working in repertory theatres. The Sheffield Repertory Theatre, for example, produced a play for one week every month of the year. The Leeds Art Theatre had a distinguished producer in Ellen



Amateur Theatre. Scene from Milton's *Samson Agonistes*, as performed by the enterprising amateur company of the Maddermarket Theatre, Norwich

Terry's daughter Edith Craig, and its productions attracted enthusiastic audiences. One of the most interesting experiments was carried out by Nugent Monck and the Norwich Players at the Maddermarket Theatre, Norwich. This society differed from most amateur dramatic companies in that it had a permanent home, a regular programme, and a professional producer. The company, however, was entirely amateur. The theatre, opened in 1921, was an exact model of an Elizabethan playhouse, and the whole of the Shakespearian repertory and the works of almost every Elizabethan dramatist of note were performed over a period of some 17 years.

Certain educational settlements, such as Citizen House, Bath, and Toynbee Hall, London, became the "Little Theatres" for their various towns or districts. In modern schools, no longer restricted to the annual, stilted "school play," acting came to be regarded as an important educational activity. Children are now more fully enabled to develop and discipline their inherent love of acting, and are increasingly anxious to continue their activity later by association with an amateur society. University amateur dramatic societies rank high, the best known being the Oxford University Dramatic Society (O.U.D.S.), founded in 1885, the Cambridge Amateur Dramatic Club, founded in 1854 and the

Marlowe Society, established in 1907 for the performance of Elizabethan plays.

There remains the largest group, those many societies, often connected with some pre-existing organization, a sports club, a commercial firm, even a church or chapel, whose members practise the dramatic art solely for their own entertainment and that of their friends, with benefit to charities as an additional but incidental justification. It was for such a society that R. C. Sherriff originally wrote *Journey's End* (*q.v.*); and for such societies J. B. Priestley wrote a special play, *Mystery at Greenfingers*. Many authorities have agreed that the amateur stage played no small part in keeping drama alive and vital during a difficult period when it had to face fierce competition from screen and radio.

The British Drama League's monthly magazine *Drama*, and the N.O.D.A. Bulletin, dealt exclusively with the amateur stage in Great Britain, and before 1939 several popular newspapers gave regular space to the activities of the amateur theatre.

Terence Dennis

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Amati. Name of a famous Italian family of violin makers. They lived in Cremona, and the first of them was Andrea (d. c. 1611). His sons, Antonio (1550-1635) and Geronimo (1556-1630), continued the work and produced some magnificent instruments. Even more successful was Geronimo's son, Nicolo (1596-1684), whose model instrument was known as the grand Amati. His pupils included Stradivari (*q.v.*). The last of the family, Girolamo, son of Nicolo, died in 1740.

Amatitlán. Department and lake of Guatemala, Central America. The former is 463 sq. m. in area and is traversed by the rly. linking Puerto Barrios with San José and Champerico. The lake, 9 m. long by 3 m. broad, is surrounded by volcanic mts.; its outlet to the Pacific, the Rio Michatoyat, has a fine waterfall.

Amatitlán. Town of Guatemala, Central America. The capital of Amatitlán department, it stands on Lake Amatitlán, 15 m. by rly. S.W. of Guatemala city and has hot springs in the vicinity. It was founded by the Jesuits, and trades in cochineal, salt, raw silk, and fruit.

Amatol. High explosive used by the British, American, and German armies during the two Great Wars. Introduced by Britain in 1915 and copied by the Germans, it is a mixture of trinitrotoluene and ammonium nitrate, the proportion of the latter varying from 80 p.c. to 20 p.c., and enabling much larger quantities of explosive to be prepared from the nitrocompound available. While not so brilliant as trinitrotoluene or lyddite, it is more powerful, and is used as a filling in bombs, grenades, shells, and mines. The nitrate is dried and ground, and then incorporated with the trinitrotoluene by one of three methods.

If the percentage of trinitrotoluene exceeds 45 it is melted and the nitrate stirred in, forming a thin sludge, which can be poured into store and solidifies to a dense mass. In amatols which contain higher proportions of nitrate the ingredients are either milled together as in making gunpowder, or are mixed in a steam jacketed vessel, when the trinitrotoluene melts and

the mixture becomes plastic and can be rammed into projectiles by hand or fed in with a worm. The milled material, however, has to be consolidated by mechanical pressure if a high density is required. The pour method of filling is used exclusively for large stores such as bombs and mines. Owing to ammonium nitrate being hygroscopic the ingress of moisture must be prevented by a sealing. At high densities amatol is decidedly insensitive, so that in shell a gain is employed whereby the explosion of the detonator is reinforced by the interposition of a priming of tetryl and trinitrotoluene. See Ammonium: Explosives.

Amatongaland. Variant name of the district in Natal better known as Tongaland (*q.v.*).

Amazosa. A branch of the southern Bantu peoples. Traveling S. under a reputed 16th century chief, Xosa, they are the true Kaffirs, occupying the coast region S. of Natal, including Tembuland, Pondoland, and the Transkei. They are dark brown, muscular, averaging 5 ft. 10 ins. in height, and intelligent. Their tribal wealth is pastoral and agricultural.

Amaziah. Son and successor of Joash, and 8th king of Judah. He defeated the Edomites in the Valley of Salt, but worshipped the gods of the children of Seir and vainly challenged Jehoash, king of Israel, who utterly defeated him at Bethshemesh. He fled to Lachish, where he was assassinated (2 Kings 14; 2 Chr. 25). The name was borne by a priest at Bethel (Amos 7), a descendant of Simeon (1 Chr. 4), and a Levite (1 Chr. 6).

Amazon, THE. River of S. America. It is 4,000 m. long, and is the first in point of length of the world's rivers, but it comes second to the Mississippi and Missouri together. In aggregate length



Amazon. Characteristic scene on the river near to its junction with the Rio Negro, its principal affluent

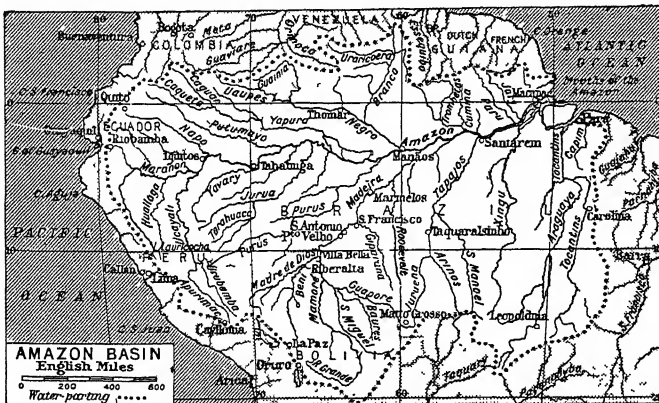
of its navigable waterways and the size of its drainage area, it is the largest; the Amazon valley and watershed cover 2,700,000 sq. m., more than the combined areas of the Mississippi and Nile basins.

The upper tributaries of the Amazon rise partly in the snows of the Andes, in Peru, Bolivia, Ecuador, and Colombia, and flow, in their upper reaches, through cañons overlooked by the ancient strongholds of the Incas. Other tributaries come from the mountains of Venezuela and Guiana, and others have their source in the Amazon plain, in Brazil. Flowing between the great ranges of the Andes from S. to N. in Peru, and from N. to S. in Ecuador and Colombia, the upper tributaries traverse some of the most rugged country on the globe, breaking through the E. Cordillera in a series of remarkable *pongos*, or narrow rapids, whence they enter the dense forests of the Amazon plain, between walls of impenetrable foliage. Here the Bolivian and other affluents, uniting with them, form the broad and com-

paratively placid Amazon, and the river, paralleling the equator, receives the waters of the Brazilian tributaries and completes its course across S. America to the Atlantic near Pará.

The first European to navigate the length of the Amazon was Orellana, a lieutenant of Gonzalo Pizarro, who, embarking upon its headwaters (the river Napo), to the E. of Quito, floated downstream to the Atlantic in 1541. The name of the river has been ascribed to a mistake of Orellana's followers, who imagined that the long-haired Indians in their cotton shirts were Amazons or women warriors. Possibly the women fought too. In 1638 Teixeira ascended the river from its mouth to Quito, later returning downstream.

The sources of the Amazon are the headwaters of the Marañon, which rises above Lake Lauricocha. Other large Peruvian tributaries are the Huallaga and the Ucayali. Ocean steamers ascend the Amazon to the Peruvian town of Iquitos, some 2,500 m. from the Atlantic, and thus navigation is afforded into the heart of S. America from Europe. Small steamers ascend to the foot of the Andes. The Napo, the Putumayo, and other tributaries come from Ecuador and Colombia. The Negro also comes from the N., and on this tributary, near the confluence, stands Manãos. The Beni and Madre de Dios, from Bolivia and Peru, fall into the great Madeira, which, traversing the Brazilian plain from the S., empties into the Amazon below Manãos. Other Brazilian tributaries, coming also from the S., above Manãos, are the Purús and the Juruá, and below Manãos the Tapajos and the Xingú. In 1914 Theodore Roosevelt discovered a new tributary of the Madeira which has received his name. The Araguaya and Tocantins in reality



Amazon. Map showing the territory watered by the great river and its tributaries. Its drainage area exceeds those of the Mississippi and Nile combined

embody a separate system, with Pará near their mouth.

All the above great streams, varying from 500 m. to 2,000 m. long, with their smaller branches, afford access to the remotest parts of the Amazon valley. The conditions of navigability, however, vary greatly according to season, the flood periods adding many thousands of miles to the distances which can be traversed by steamer, canoe, or raft. In very dry seasons the fluvial port of Iquitos is reached with difficulty by ocean steamers. On the Madeira the head of steam navigation is at Porto Velho, above S. Antonio, and 1,000 m. from the main Amazon; and the elevation of the river here is 600 ft. above sea level.

Two flood periods occur annually in the Amazon, influenced respectively by the northern and southern-flowing tributaries. One is in Nov. and Dec., and the other, the principal, from March to June, causing a maximum rise of 45 ft. in the waters of the river. The Amazon, 2,000 m. from its mouth, on the Peruvian frontier at Tabatinga, is 9,000 ft. wide, with a normal depth at that point of 66 ft., and a current velocity of $1\frac{1}{2}$ m. per hour. Lower down, where the great Brazilian affluents enter, and nearer the mouth, it resembles a sea rather than a river. Tides are felt 500 m. above the mouth where the river is 200 ft. deep; near the main mouth it is 50 m. wide.

Many geographical and scientific expeditions have studied the Amazon and its hinterland in modern times. A British explorer, Col. P. W. Fawcett, was lost with his small party in the Xingú-Tapajos region in 1925. Three years later a relief expedition found evidence that they had met their deaths at the hands of natives.

Bibliography. *The Naturalist on the Amazon*, H. W. Bates, 1863; *The Sea and the Jungle*, H. M. Tomlinson, 1912; *Amazon and Andes*, K. G. Grubb, 1930; *Amazing Amazon*, R. and B. Brown, 1943.

Amazonas. Largest state of Brazil. Occupying an area of 731,363 sq. m. in the basin of the Amazon, it is densely wooded, especially S. of the river. The rich soil produces rubber, coffee, rice, and fruits, while cattle are extensively reared. Manaus is the capital and chief port. Pop. 463,900.

Amazonas. A department of Peru. It has an area of 13,943 sq. m., comprises the upper valley of the Marañon, the head stream of the Amazon, and produces

tobacco and sugar-cane. Pop. 65,137. Capital, Chachapoyas.

Amazonas. A territory of Venezuela. Forming a wedge between Brazil and Colombia, and giving rise to the Orinoco, it is mainly covered with forests, but some rubber is produced. Capital, Puerto Ayacucho. Pop. 3,728.

Amazon Cloth. All-wool plain dress fabric. It drapes elegantly, and is made usually of S. American merino wool, combed without oil and spun upon mule frames.

Amazons. In Greek legend, a race of women warriors, whose kingdom lay on the S. shores of the Euxine or Black Sea. Headed by their queens, they fought against Greece and other states and extended their empire as far as the Caspian Sea. No men were allowed within their borders, and when they wished to have children they visited other tribes. Only the girls were reared. Amazons are represented in Greek art as beautiful women, armed for battle, mounted on fiery horses and trampling on their fallen foes.

Legends without number cluster round the names of the Amazon queens. Thalestris disdained any lesser mate than Alexander the Great; Penthesileia led her hosts against the Greeks in the Trojan War and, dying at the hand of Achilles, drew tears of pity from her slayer. Antiope, won in battle by Theseus, later fought at his side when he undertook a second expedition against the Amazons to help Hercules (Hercules) to obtain the golden girdle of Queen Hippolytē, her sister. Whether the Amazons really existed remains doubtful. Diodorus Siculus speaks of a race of African Amazons, prototypes perhaps of the women warriors of Dahomey. *Consult* Religious Cults Associated with the Amazons, Florence M. Bennett, 1912.

Amazon Stone. Variety of the potash-felspar microcline. Usually of a green colour and occurring as a constituent of coarsely crystalline granites and pegmatites,

it is used in ornaments. It is found chiefly in the Urals, Colorado, and Madagascar.

Amba Alagi. Mt., more than 10,000 ft. alt., in Abyssinia, near Magdala, W. of the Eritrean border. It was the scene of the surrender of the duke of Aosta (*q.v.*) and his Italian army in May, 1941. The Italians had been skilfully hemmed into the mountain fastness of Amba Alagi by the Imperial forces, who carried out an ingenious plan with great courage and determination under Gens. Cunningham and Platt. As a result of these operations, the enemy was surrounded by May 15, and the strongly fortified caves of Amba Alagi, at a height of some 9,000 ft., were rendered valueless. On May 16 Aosta sent emissaries to Gen. Cunningham to ask for terms. Unconditional surrender of his exhausted and half-starved men followed; they were granted the honours of war. Aosta, with five generals and other staff officers, was among those who surrendered. Prisoners numbered some 18,000, of whom about 7,000 were Italians. After the fall of Amba Alagi the only Italian stronghold to continue resistance was Gondar (*q.v.*), which surrendered unconditionally after a six months' siege. *See* East Africa Campaign.

Ambala OR UMBALLA. District and town of India, in the E. Punjab prov. The area of the district is 1,851 sq. m. and the population about 800,000. The town of Ambala, capital of the prov. since its formation in 1947, is at the junction of the North-Western rly. and the rly. from Delhi to Simla. An important garrison town during the time when it was under British rule, it is the centre of a large trade in grain and cotton goods. Pop. 76,326.

Ambarawa. Town of Java, Indonesia. It is situated 260 m. E.S.E. of Batavia, and has a station on the coast-to-coast rly. During their occupation of Java the Japanese set up here an internment camp for Dutch civilians which in Nov., 1945, was savagely attacked by Indonesian terrorists, a number of the inmates being killed. A small force of Gurkhas, part of the British force landed in Sept. (*see* Indonesia), reached the camp Nov. 22, severe fighting followed, and it was Dec. 14 before the internees were evacuated to Semarang.

Ambassador (late Lat. *ambascia*, mission, agency). Name given to the representative of one



Amazon
Vatican, Rome

country in the capital of another. In practice the word is reserved for the representatives sent by one Great Power to another, those sent to less important countries being called ministers, envoys, or *chargés d'affaires*. Great Britain, for instance, is represented by an ambassador in Washington and Paris, but only by an envoy or minister in Stockholm and Berne.

Ambassadors are of two kinds, ordinary and extraordinary. The ordinary are entrusted with the conduct of diplomatic business between the two countries and hold office for a number of years; extraordinary have a particular duty, e.g. that of representing their country at a peace conference. Ambassadors are regarded as direct representatives of their sovereigns, and as such have many social and other privileges. In order of precedence in Great Britain they come immediately after princes of the blood and before the archbishop of Canterbury. They have direct access to the sovereign in whose land they reside, although in Great Britain and other constitutional countries such interviews are always held in the presence of a responsible minister. Their residences, which are regarded as standing on the soil of their own country, are free from rates and taxes, and ambassadors and their attendants are not amenable to the law of the land in which they live.

The business of an ambassador is to keep his own government acquainted with the ideas and opinions of the country to which he is accredited. His status is mainly regulated by the treaties of Vienna (1815) and Aix-la-Chapelle (1818). Before the Second Great War, Great Britain sent ambassadors to some 28 countries. The U.S.A. began to send out ambassadors in 1893; before that date it sent simply ministers. In 1945 there were 32 U.S. ambassadors to various countries. The U.S.A. had also introduced women ambassadors. The withdrawal of an ambassador is usually a preliminary step to a declaration of war. See Diplomacy.

Ambassador. British monoplane, formerly the A.S.57. It was designed and first built in 1945 at the Airspeed factory, Christchurch, for use on European main line services, with accommodation for 28 or 36 passengers, and two Bristol Centaurus engines, each of 2,500 h.p., giving a cruising speed of between 200 and 285 m.p.h.

Ambassadors Theatre. London playhouse, in West Street, Shaftesbury Avenue, W.C.2. It was opened June 5, 1913. Here during 1944-48 successive revues, *Sweeter and Lower*, *Sweetest and Lowest*, ran respectively 870 and 793 perfs.

Ambato. Town of Ecuador. Capital of Tungurahua province, it stands on the N.E. slope of Chimborazo, 8,600 ft. above sea level and 80 m. S. of Quito, on the rly. to Guayaquil. An eruption of Cotopaxi destroyed it in 1698, and a series of earthquakes in 1949 caused very wide damage with heavy loss of life. Normally it makes boots, shoes, and cordage, and trades in grain, sugar, fruit, and cochineal. Pop. 25,200.

Ambela. Mt. pass of Pakistan. Situated in the N.W. Frontier province, about 30 m. N.E. of Peshawar, it was the scene of British military operations in 1863 against the tribes of Swat and Buner.

Amber (Arabic *anbar*, *ambergris*). Fossil resin derived from extinct coniferous trees and occurring almost exclusively in clays of the Oligocene system. It is found principally on the southern shores of the Baltic and in pits or mines in Samland, former E. Prussia. It occurs also in Sicily, Poland, Saxony, Siberia, Greenland, China, and Siam, and pieces are found on the E. coast of England. Baltic amber varies in colour from pale yellow to reddish brown and is either transparent or exhibits different degrees of turbidity. The trade classifications—clear, cloudy, frothy, bone, etc.—refer to these appearances. Sicilian amber is red with green or blue fluorescence.

Amber takes a high polish and is used for the manufacture of beads, the mouthpieces of pipes, cigar and cigarette holders, and the handles of umbrellas. The small pieces are made into a varnish. The powder obtained in working amber can be distilled, when it yields oil of amber, employed as an ingredient in a liniment and in the manufacture of a variety of artificial musk. Small pieces of amber, by heat and strong pressure, are compressed into a solid substance known as ambroid, which is employed for ornamental purposes. When amber is rubbed it becomes negatively electrified and emits a pleasant odour, these features serving to distinguish amber from common copal, which is similar in appearance. Pieces of amber often entomb flies and fragments of organic matter. The expression "like flies in amber" refers to this. Besides resins, there

is present in amber from 3 p.c. to 8 p.c. of succinic acid. Green and blue ambers exist, but are rare.

Amberg. Town of Bavaria. On the river Vils, 41 m. by rly. E. of Nuremberg, it has some old walls and moats, and a town hall dating from 1490. It manufactures beer, cotton, ironmongery, and earthenware. Pop. 26,330.

Ambergris (Fr. *ambre gris*, grey amber). Fatty substance, grey in colour, formed in the intestines of the spermaceti whale. It contains veins resembling marble, and is usually found in warm climates, washed up on the shores or floating on the water in masses weighing up to 270 lb. It dissolves in ether and volatile oils and is used very largely in perfumery as a base for various perfumes.

Amberite. Older form of smokeless powder. Manufactured for sporting guns, it is of the type known as a 42-gr. powder, since this weight occupies the same space as the standard charge of 82 gr. of black gunpowder. Hard shooting with safety, great penetration, and only a moderate strain on the gun are claimed for it. Its analysis shows the following composition: nitrocellulose, 71 p.c.; barium nitrate, 18.61; potassium nitrate, 1.2; vaseline, 5.8; wood meal, 1.4. See Explosives.

Amberley. Village of Sussex, England, on the Arun, 5 m. N. by road from Arundel, with a railway station. It has a ruined castle of the bishops of Chichester, dating from 1377. After rain the Wild Brooks provide anstrond. Another Amberley is near Stroud, Gloucestershire.

Ambidexterity (Latin *ambo*, both; *dexter*, right-handed). Ability to use the right and left hands with equal facility, often observed in artists and surgeons. In law the word was early used for the receiving of bribes from both parties in a suit by a juror. In the 17th century the form *ambodexterity* was more common.

Ambiguity (Latin *ambiguus*, doubtful). Word signifying double meaning, a frequent subject of debate in law. Two kinds of ambiguity, latent and patent, may occur in documents. A latent ambiguity, which arises from the use of words which have two meanings, may always be cleared up by extensive evidence. For instance a man might leave a sum of money to "my grandson Frederick." If he had two grandsons of that name evidence would have to be put forward, showing which of the two was meant. A patent ambiguity, however, cannot

be explained by verbal evidence. Where words in a document are ambiguous, they ought to be interpreted against the person who drew the document.

Ambleside. Urban district and market town of Westmorland, England. It is in the valley of the

on the Loire, 15 m. by rly. E. of Tours. It has manufactures of cotton, steel, and leather, and a trade in wine. The castle was from 1431 a royal residence, and Charles VIII was born and died here. Its chief features are the Gothic chapel of S. Hubert, where Leon-

out legal and eccles. reforms, but his foreign policy, directed towards strengthening French influence in Italy and winning the papacy for himself, was unsuccessful. Rouen benefited by his generosity, and his relief work during the plague in 1504 endeared him to the citizens. He died at Lyons, May 25, 1510. His tomb in Rouen Cathedral is fine Renaissance work.

Amboyna OR AMBOINA (Dutch, *Ambon*). Island of the Molucca group, Indonesia, lying about 10 m. off the S.W. extremity of the island of Ceram. Its area is about 360 sq. m. and its 1941 population was about 278,000. It consists practically of two peninsulas, Leitimor and Hitoe, with the Bay of Amboyna between them. Although mountainous, it is fertile, and produces cloves (its speciality), sago, sugar, rice, coffee, and pepper. Amboyna wood, which is found on Amboyna and on Ceram, is used in veneer form in fine cabinet work and small fancy articles such as tea caddies and cigarette boxes. Amboyna, the capital, has a good roadstead, and an inner harbour which is almost completely landlocked.

Shortly before the outbreak of the Second Great War, Amboyna



Ambleside. General view of this beautifully situated Westmorland town, near Lake Windermere. In the background is Wansfell

Rothay, at the foot of Wansfell Pike, 1 m. from the head of Lake Windermere. The church of S. Mary, designed by Sir G. G. Scott, has a memorial window to Wordsworth. On the last Saturday in July a rush-bearing festival is held here, as well as at Grasmere. Ambleside is an excellent centre for excursions. Market day, Wed. Pop. 2,343.

Amblystoma (Gr. *amblys*, blunt; *stoma*, mouth). Genus of salamander, found in the U.S.A. and Mexico. It is the sexually mature stage of the axolotl (*q.v.*).

Ambo (Gr. *ambōn*, from *anabainein*, to ascend). Rostrum or reading desk with steps whence the Gospel and Epistle were read, notices given out, and sermons occasionally preached in early Christian churches. It was largely

ardo da Vinci is said to have been buried, the three massive round towers, and the oubliettes or underground cells, in which political prisoners were confined. It was used in the 19th century as a state prison, and in 1875 the comte de Paris, to whose family it belonged, began to restore it, but the work was still incomplete when the ruins were seriously damaged in the Second Great War. Other notable buildings are the churches of S. Denis and S. Florentin, and one of the town's old gates. Amboise is memorable

for the Huguenot conspiracy of 1560 against the Guise party and for the edict of 1563, which conceded valuable privileges to the Protestants.

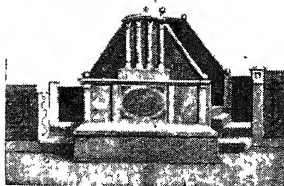
Amboise, GEORGES D' (1460-1510). A French statesman and cardinal. Born at Chaumont-sur-Loire, of a noble family, he served as almoner to Louis XI before being appointed archbishop of Narbonne in 1492 and of Rouen in 1493. He was made chief minister by Louis XII in 1498 and created a cardinal. In his internal administration he carried



Amboise. Ancient French town on the Loire once a royal residence

became, after Surabaya (*q.v.*), the largest naval and air base in Indonesia.

The island was discovered by the Portuguese early in the 16th century, and was taken by the Dutch about 1609. The Dutch held it until 1796, and regained it from Britain at the peace of 1802, but it was again in British possession from 1810-14. The population consists of Malays with a few European and Chinese settlers. The Dutch residency of Amboyna included Buru, Ceram,



Ambo, or reading desk

superseced by the pulpit. Examples are in the churches of S. Clement at Rome and S. Thomas, Hanwell, Middlesex. The plural is amboines.

Amboise. A town of central France, department of Indre-et-Loire. The ancient Ambatia, it is

and other islands having a total area of nearly 20,000 sq. m.

Ambosyna was known to British people from the massacre of 1623. Its trade was then confined by treaty to the two East India Companies, English and Dutch, and the Dutch tried to expel their rivals. Some English residents being charged with conspiring to seize the castle at Ambosyna, their settlement at Cambello was destroyed, and many of them were tortured and put to death. When England and Holland made peace in 1654, the Dutch paid £300,000 as compensation. Dryden made the incident the theme of a tragedy.

On Jan. 30, 1942, in the course of their attack on the Netherlands E. Indies and their encirclement of Java, Japanese aircraft made a heavy assault on Ambosyna; and on the same night troops were landed from a powerful Japanese fleet. Bitter fighting developed, but by Feb. 7 the island was in Japanese hands, and remained so until the official surrender of Indonesia to Australian forces, Sept. 8, 1945.

Ambrine. Mixture of melted paraffin and amber resin, a remedy for burns and scalds. It was discovered in 1904 by the French doctor, Barthe de Sandfort, who had used it first on himself, in seeking to reproduce the properties of the Dax mud baths, to relieve rheumatism. Its efficacy in treating burns was first proved on a Chinese during the Boxer rebellion; but this use was not general until the First Great War.

Ambriz. A town of Angola, Portuguese W. Africa. It is at the mouth of the Loje, 70 m. N. of Loanda, and was regarded as the most N. point of the Portuguese possessions in W. Africa before the Anglo-Portuguese treaty of 1884. Coffee, rubber, and copal are exported.

Ambros, AUGUST WILHELM (1816-76). Austrian composer and writer on music. Born at Mauth, Bohemia, Nov. 17, 1816, he spent many years in the civil service, devoting his leisure to the study of music. His *History of Music*, 5 vols., 1862-82, is a work of high authority. He died at Vienna, June 28, 1876.

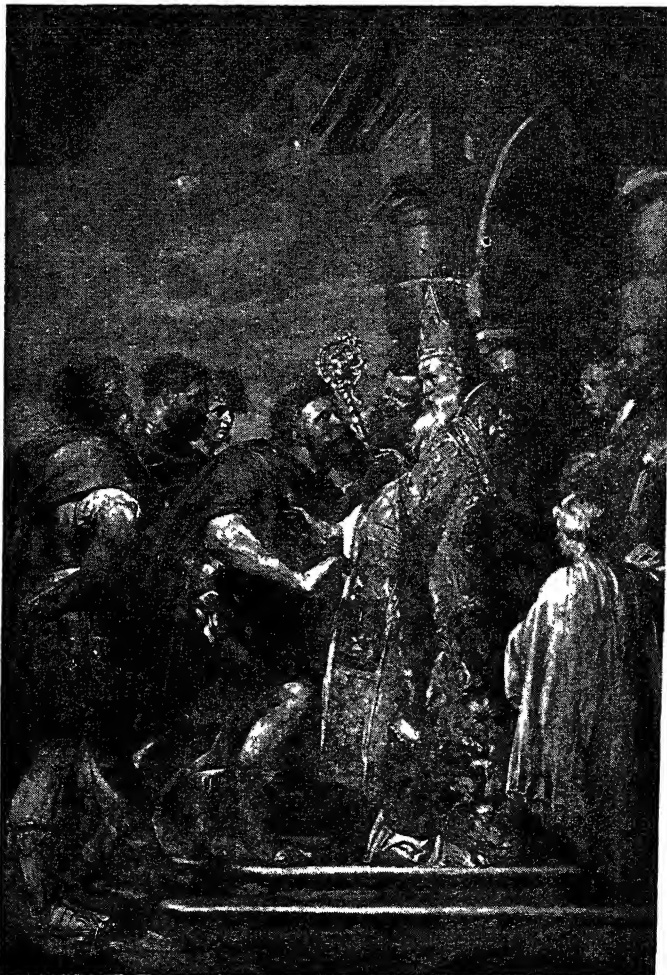
Ambrose, SAINT (c. 340-97). Bishop of Milan. Son of a Christian prefect of Gaul, his place of birth is disputed, the cities of Trèves, Arles, and Lyons claiming the distinction. He was trained at Rome for the law and was sent to Milan as consular governor of Liguria and Aemilia.

In 374, on the death of the Arian bishop of Milan, Ambrose, then a layman, was chosen to succeed him. The first ten years of his episcopate were largely occupied with the Arian controversy. Presiding over the council of Aquileja (381), Ambrose secured the deposition of the Arian bishops of Illyricum and refused the demand of the empress Justina (mother of Valentinian II) for a church in Milan for the Arians. The long struggle with the empress over the question of recognizing Arian worship ended in favour of the bishop. The popular story of S. Ambrose excluding the emperor Theodosius from the church, after the massacre of the Thessalonians, is an exaggerated version of what took place. Some 7,000 citizens had been massacred, under the

authority of Theodosius, after an outbreak of sedition, and Ambrose to avoid meeting the emperor retired from Milan, and in a letter urged Theodosius to do penance. Theodosius complied, "stripping himself of every emblem of royalty," and the friendship between the two lasted till the death of the emperor in 395. Ambrose died on Good Friday, April 4, 397, and his day is observed on April 4.

Ambrose wrote much against the Arians and was one of the earliest Latin hymn writers. *Consult* Life, J. V. Albert, duc de Broglie, Eng. trans. M. Maitland, 1899.

Ambrosia (Gr. *ambrotos*, immortal). In Greek and Roman mythology, the food of the gods. It conferred immortality on those who ate it, and possessed the power of healing wounds. Its taste



S. Ambrose refusing Theodosius entry to church after the massacre of the Thessalonians. A great painter's rendering of the legendary story
Painting by Rubens, Imperial Art-History Museum, Vienna

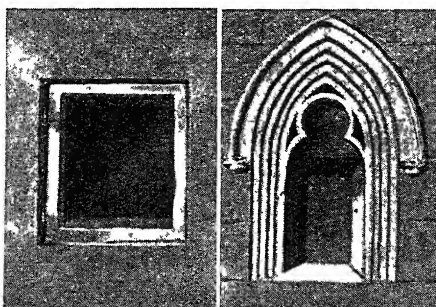
was nine times as sweet as honey, and its fragrance delicious. Juno and Aphrodite anointed their flowing locks with ambrosia, and in the Aeneid Virgil tells how Venus used it as a salve to cure the wounds of her son.

Ambrosian Chant. Term applied to the traditional ritual music of the Christian church, held to have been systematised by S. Ambrose, who probably composed the melodies for his own hymns. Now used only in the diocese of Milan, it was in the late 6th century merged in the Gregorian chant introduced by Pope Gregory the Great.

Ambrosian Library. Famous library of Milan. Founded by Cardinal F. Borromeo and named after S. Ambrose, it is housed in a building erected for it 1603-09. It contained 230,000 vols. and 8,400 MSS., including fragments of a 4th century MS. of Homer, a Virgil annotated by Petrarch, an early 14th century MS. of Dante's Divine Comedy, and drawings and MSS. of Leonardo da Vinci. In the Second Great War the most valuable material was removed to safety, but there was some loss by fire of the remainder.

Ambrosius, AURELIANUS. A leader of the Britons during the 5th century. Of Roman descent, he drove the Saxons back to the Isle of Thanet. His Celtic name was Emrys. Gildas and Geoffrey of Monmouth refer to Ambrosius as the son of Constantine, emperor of Britain, Gaul, and Spain, and state that he was poisoned by a Saxon at Winchester.

Ambry, AUMBRY, ALMERY, OR ARMALIORUM (Lat. *armarium*, cupboard, or safe). In medieval churches, a cupboard or niche in a wall with shelves for the sacred vessels, the Host, holy oil, etc. Large churches might possess



Ambry. Two examples of this form of cupboard or niche in a church wall

several ambries. In monasteries the word was applied to linen presses or pantries, and is still used in this sense in Scotland.

AMBULANCE: FOR SICK AND INJURED

Henry T. Ferrier, F.R.S.A., Officer of the Order of St. John

This article by the joint secretary of the Ambulance Committee, Order of St. John and British Red Cross Society, and former Director of Transport of Wounded, reviews the development of the ambulance service, military, civil, and civil defence. See also under Nursing; Red Cross; St. John Ambulance Assoc., etc.

The word ambulance, derived through the French from the Latin *ambulare*, to move about, was originally used to designate a movable hospital. Since the Crimean war, however, it has become a generic term in popular use for vehicles or conveyances of the sick or wounded. The correct military definition of a field ambulance is now a mobile field medical unit.

MILITARY. The French army surgeon, Larrey, while serving on the Rhine in 1792, proposed the formation of a field hospital. Larrey conceived the idea of a system of light but strong carriages suspended on springs, in which the wounded could be rapidly collected from the battlefield. His "flying ambulance" was subsequently adopted throughout the French army.

In the meantime no efficient ambulance system was adopted by Great Britain. Throughout the Peninsular war the British wounded were removed from the field of battle on stretchers carried by bandmen, who took them as far as the first line of surgical assistance, whence they were conveyed to hospitals in the carts of the commissariat, or in bullock waggons. At the outset of the Crimean war, ambulance waggons did not exist in the British army. The wounded were moved in carts drawn by horses, or were seated in cacolets suspended on either side of a mule, and the system broke down to a lamentable extent. An ambulance waggon similar in construction to that used by the French was adopted after Sidney Herbert's commission, 1857-58, and a few British

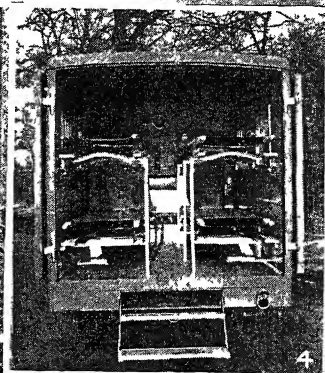
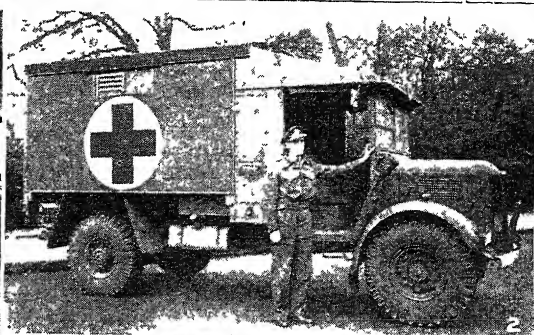
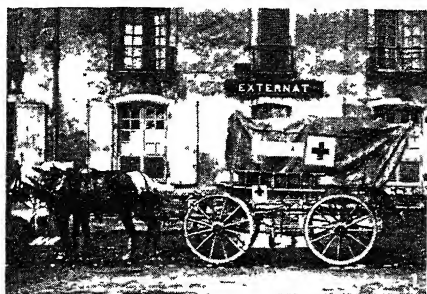
horse-drawn ambulances were used in the Franco-Prussian war, 1870. From that time to the outbreak of the First Great War no outstanding improvements took place in this form of medical transport.

In Sept., 1914, a few members of the Royal Automobile Club offered to place themselves and their cars at the disposal of the Red Cross. The next day several of these cars went over to France. By the end of Jan., 1915, 830 motor ambulances had been landed in France by the British Red Cross. From ten to fifteen tons of spare parts were shipped weekly. In the interests of standardisation the number of varieties of cars was reduced to sixteen. Altogether more than 2,000 cars converted for ambulance work were dispatched, covering every theatre of war. Later the Red Cross units were partly or wholly absorbed into the army medical units under the R.A.M.C. and R.A.S.C. Wide use was also made of motor launches in Mesopotamia, Egypt, the Dardanelles, Malta, German East Africa, and elsewhere.

Ambulance Trains

The earliest railway ambulance trains were seen during the Crimean war in 1855, the Italian campaign in 1859, and the Slesvig-Holstein war of 1864. But these were primitive adaptations. In 1900 the first train built expressly for the British Red Cross Society was sent to South Africa for use in the Boer war. In 1915 a more completely equipped train constructed by the Birmingham Rly. Co. was shipped to France. In the main the arrangements for the wards followed the design of the train of 1900. The beds were supported on brackets in tiers, and were capable of being removed and used as stretchers, the patient thus being placed in his assigned berth without change. The wards were constructed for 36 patients. A main kitchen, surgery, subsidiary kitchen, mess, and sleeping accommodation for the staff were also provided. The ambulance trains used in the Second Great War did not differ materially. Equipment was more modern and elaborate.

The most notable developments between 1939 and 1945 were the use of aircraft in the rapid transport of wounded from the battlefield to home-based hospitals, and the insistence by the War Office on a single standard ambulance in every theatre of war. Built to the design of War Office experts, it was constructed to be



1 British ambulance used in the Franco-Prussian war (1870). 2 Austin 24 h.p. ambulance as operated by the Army and the Red Cross, 1939-45 3 and 4 Bedford four-stretcher ambulance; note retractable steps and open doors lying flat against vehicle 5. W.A.A.F. nursing orderlies tending a patient in an air ambulance

6 Green Line coaches converted into ambulances, they were extensively used during the Second Great War for bomb victims. 7 Casualty awaiting evacuation from Tunisia by a Lockheed Lodestar aircraft 8 One of the ward coaches in an American Army Red Cross train built in Gt. Britain

AMBULANCE: VEHICLES AND MACHINES FOR CONVEYING THE SICK AND WOUNDED

Photo, 7, British Official: Crown Copyright reserved

mounted on a 24 h.p. Austin chassis, with large track-type tires, incorporating a stretcher-loading device of unique design. The carrying capacity was 4 stretcher cases or 10 sitting cases or 2 stretcher and 5 sitting cases. Constructed to operate under desert conditions, through ploughed fields, or water, and proofed against chemical warfare, it was easily handled by the women of the services. Over 13,000 were constructed before the "Austin K2" ceased production in Aug., 1945.

CIVIL. Before 1914 the sight of an ambulance on the roads of England was a rare event. Here and there in the larger towns a horse-drawn ambulance might be seen. It was a dingy vehicle, and its duty was generally confined to the carrying of infectious cases to the isolation hospital. In only a few of the great cities had municipal authorities established a motor ambulance service. The London County Council was content with the service of hand-propelled wheeled litters established by the police. There was much more home treatment of the sick and much less institutional treatment, and road accidents too, which now figure so largely in the long day's work of the ambulance service, were on a much lower scale.

In 1909 Sir W. J. Collins introduced and piloted through Parliament a bill enabling the L.C.C. to establish a motor ambulance service, but it was not until 1915 that this service was inaugurated to deal with street accidents.

National Ambulance Service

The end of the First Great War afforded an opportunity for meeting a civilian want that had become urgent. Many of the ambulances of the joint war organization of the Order of St. John and the British Red Cross Society were available. The two organizations therefore arranged to continue their association in promoting the health of the community. One of their first steps, for which Sir Ernest H. Clarke was responsible, was the organization of a national ambulance service for England, Wales, and Ireland. A committee of experts, the Home Service Ambulance Committee, was founded in 1919. The number of ambulances operating in 1943, twenty-four years after the inception of the service, was nearly 600, administered and controlled by units of the "Order" and the "Society."

The modern trend aims at the rapid transport of a casualty,

whether civil or military, to the properly equipped first-aid post, casualty clearing station, or hospital with as little interference as possible. Though this may be sound practice in towns, in districts remote from hospitals or skilled medical aid every provision must be made by the ambulance team to avoid further risk during the journey. While an invalid is being moved from home to hospital, he must be subject to ordinary sick-room procedure. So in every properly organized ambulance service the driver of the vehicle must be trained in first aid, and the attendant, male or female, must be skilled in home nursing and first aid. The special case will demand the extra services of the trained nurse.

CIVIL DEFENCE SERVICES. Before, and immediately after, the outbreak of the Second Great War, every conceivable form of ambulance came into being in great numbers to supplement the existing ambulance and A.R.P. services. Under government instructions, local authorities pressed into service both commercial and private vehicles, the former being supplied with the simplest forms of stretcher gear, the bodies of private cars being sawn in two and light box bodies fitted. Thousands of cars were so adapted throughout the country to meet the anticipated need. Later in the war, large 32-seater coaches were converted to take 16 stretchers, and were used principally to remove patients from the congested central hospitals to base hospitals outside the London area.

DESIGN. Modern ambulances for civil purposes are mostly restricted to the single-stretcher type plus sitting accommodation for at least three persons, provision being made for an occasional second stretcher by inversion of the long seat, withdrawal of concealed runners, or operation of patent gear. Normally the four-stretcher type is favoured for inter-hospital transport or the removal of convalescent patients. Designs vary considerably; but the less complicated the lay-out of an ambulance, the greater the freedom from rattles, squeaks, and other extraneous noises. Body design falls into four distinct types: accident, general service, long distance, and the infectious.

An interesting innovation reported by the Victoria civil ambulance service, Melbourne, Australia, was the installation of a 200-watt radio telephone trans-

mitter at its H.Q. The 17 ambulances in the accident service are equipped with crystal-locked receiving sets, thus providing instantaneous communication.

The Public Health Act, 1936, and the Public Health (London) Act, 1936, gave local authorities the power to run ambulance services. Some are doing so, while others have confined themselves to accident cases, leaving the rest to some other ambulance organization or even to private enterprise. Like the hospital services, the ambulance services of Great Britain have developed along individualist lines. Voluntary effort has been evident all through their history. It is realized by all concerned that this specialised ancillary medical service can be made more effective with nation-wide coordination. To this end the Home Service Ambulance Committee of Joint Order of St. John and the British Red Cross Society, by far the largest single ambulance organization in the country, cooperates with the Ministry of Health. County and regional surveys were carried out in 1944. History repeated itself at the end of the Second Great War: the Home Service Ambulance Committee became the medium whereby hundreds of ambulances were to be allocated as needed, and proceeded to a completion of a scheme for the final coordination of all the ambulance services of the country.

Ambulatory (Latin *ambulatio*, promenade). In monastic or ecclesiastical architecture, any covered gallery or passage such as cloisters, or a place for processions leading behind the high altar and round a church. There are double ambulatories in the cathedral of Notre Dame at Paris and in that of Chartres. See Cathedral.

Ambush (Lat. *in*, in; late Lat. *boscus*, wood or bush). A term applied to the concealing of soldiers or others with a view to a sudden attack, and also to the place of concealment and to the men concealed. Ambuscade is an older and less usual form. As ambuscading can only be employed where small bodies of men are concerned, it has almost disappeared from modern formal warfare, though it is still effective in guerilla and "underground" warfare. The word originally meant hiding in a bush or thicket.

Ameer or **EMIR** (Arab, *amara*, to command). Title used in the Mahomedan East, meaning commander. Originally a military title,

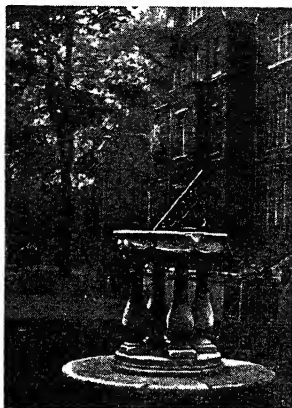
it came to be applied generally to rulers and high officials and as a title of dignity to the descendants of Mahomet. The rulers of Afghanistan and Transjordan are ameers. As leader of Islam the sultan of Turkey was called Amir ul Muminim or commander of the faithful. The word admiral comes from *amir al (bahr)*, commander of the (sea).

Ameer-Ali, SYED (1849-1928). Indian lawyer. Born April 6, 1849, he became an English barrister in 1873, and was appointed lecturer on law at the Presidency College, Calcutta. He was afterwards chief magistrate of Calcutta (1878-81) and member of the legislative council of Bengal (1878-83). In 1883 he became a member of the legislative council of India, and in 1890 a judge of the High Court of Calcutta. In 1909 he was appointed a member of the Judicial Committee of the Privy Council, by virtue of an Act empowering the sovereign to appoint to regular and paid membership of that body someone who had held high judicial office in India. A great authority on Mahomedan law, he wrote *Personal Law of the Mahomedans*; other works of his pen were *The Ethics of Islam*, *The Spirit of Islam*, and *A Short History of the Saracens*. He died Aug. 3, 1928.

Amelia. City and episcopal see of central Italy, Terni province. It is 21 m. S.W. of Spoleto, 1,300 ft. above sea level. One of the oldest cities of Umbria, it was known to the ancients as Ameria. There are fine remains of the original city walls. The bishopric dates back to the 4th century.

Amelia. Fourth and last of Henry Fielding's novels, published in 1751. The story is one that broke with an early convention of the novelist, in that it begins with the marriage of its hero and heroine Lieutenant Booth and Amelia Harris, who are supposed more or less closely to represent the author and his first wife. With less broad humour and variety than is found in Fielding's earlier novels, *Amelia* is a faithful presentation of certain sides of social and domestic life of the first half of the 18th century. It was highly regarded by Dr. Johnson, and Thackeray thought it the author's finest work.

Amélie-les-Bains. Watering-place of France, named after Amélie, wife of Louis Philippe. It is in the dept. of Pyrénées-Orientales, at the union of the Tech and the Mondony. Standing high, it is visited for its sulphur waters, which are used for both bathing and



Amen Court, London, E.C
Judges' Ltd

drinking. They were known to the Romans, many remains of whose baths have been found.

Amen (Heb., truly, so let it be). In public worship, word used in confirmation of a statement, as at the end of the Creed; or added in a petitionary sense to a prayer, as customary from apostolic times. In the English Prayer Book, when the word is printed in Roman characters it is pronounced by minister and people in unison; when in italic by the people only. In the Authorised Version of the Bible at the beginning of a sentence it is used for emphasis (e.g. Jer. 28, 6; Mark 10, 15) and is translated "verily." The Hebrew of Is. 65, 16, has "the God of Amen," which is translated in A.V. "the God of truth"; in Rev. 3, 14, Christ is called "the Amen, the faithful and true witness." As in liturgical use the word is so frequently sung or intoned, musical settings of the word are innumerable. Examples are Naumann's threefold Dresden Amen (named

after the Chapel Royal at Dresden, and introduced into Wagner's *Parsifal*) and Stainer's *Sevenfold Amen*; and Handel's great *Amen Chorus* is a sublime finale to his oratorio *Messiah*.

Amen Court. Enclosed court in the City of London, containing the residences of the canons of S. Paul's Cathedral. It opens from Ave Maria Lane and Amen Corner, and before the war time devastation of the district its quietness was in marked contrast to the bustle without. The name is a reminder of the days when religious processions marched round S. Paul's. The singing or chanting was so timed that the Amen was sung when the priests and singers reached Amen Corner. The court was damaged by the air raids of 1940-41, though not irreparably, nor, indeed, in any measure relative to the great destruction in its immediate neighbourhood.

Amendment (Latin *emendare*, to correct). Act of amending or improving anything. The term is applied particularly to any alteration suggested in a bill before Parliament or a resolution before a public meeting. British practice is for the amendment to be voted upon before the main resolution; if carried, the resolution, as altered by the amendment, is put to the meeting for acceptance. In Parliament an amendment is sometimes used to change entirely a clause in a bill and so destroy the bill. This takes the form of moving that after the first word, usually "that," the whole clause is deleted and something different substituted.

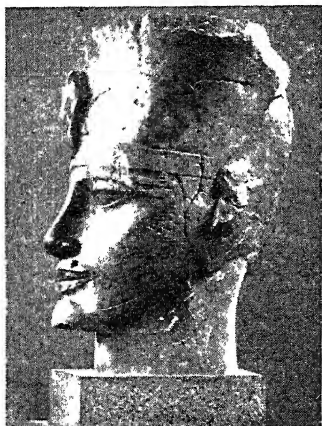
As a legal term, amendment means the correction of an error in a pleading or other judicial proceeding. Modern legislation has made this much easier, and it is now mainly a question of costs. In the U.S.A. alterations in the constitution are called amendments. To make these, legislation under special conditions laid down in the constitution is needed.

Amenemhat. Name of four Egyptian kings of the XIIth dynasty. The greatest, Amenemhat III, built an embankment 20 m. long for reclaiming 40 sq. m. from Lake Moeris in the Fayum. His pyramid there contains a sepulchral chamber hallowed out of a single 110-ton quartzite block. Near this was a funerary temple, celebrated in antiquity as the Labyrinth. See Pyramids.

Amenhotep. Name of four Egyptian kings of the XVIIIth dynasty. Called by the Greeks Amenophis, the most famous, Amenhotep III, c. 1400 B.C.,



Amenemhat III, a contemporary
portrait carved in obsidian
Egypt Exploration Society



Amenhotep III. Portrait head from a colossal statue of the Egyptian king
British Museum

exacted tribute from Nubia to the Euphrates, and wedded a half-Syrian queen Tui. His diplomatic correspondence has been recovered. He sculptured a rock-cut tomb and the colossi of Memnon at Thebes. His son, Amenhotep IV, renamed Akhnaton (*q.v.*), who succeeded him, sought to make the Egyptians worship one god only, the sun-god.

Amen-Ra OR AMMON. An Egyptian deity. Amen, or the hidden one, was a local Theban god whose worship developed after the Hyksos expulsion. In combination with the sun-god, Ra of Heliopolis, he became the national god of the new empire (XVIIIth-XXVth dynasties), the reigning queen being his high priestess. He is usually depicted in a cap with two high plumes.

Amentaceae (Latin *amentum*, thong, strap). Family of trees and shrubs which have alternate leaves and unisexual flowers without petals. The males are often in pendulous spikes or catkins known as amenta. The order consists of ten genera, which include about



Amentaceae. Aspen leaves and catkin

400 species, among them some of the best-known timber trees, such as oak, beech, hornbeam, alder, birch, and chestnut. They are chiefly characteristic of the N. temperate regions, but a few are found in the S. hemisphere.

Amenti OR AMENTER. The underworld of the ancient Egyptians. This hidden land was

inhabited by human souls journeying to the peaceful fields of the blessed. In one account it was traversed nightly by the sun-god Ra; in another the dead soul was weighed in the balance in the presence of its lord Osiris.

Amercement OR AMERCIAMENT (late Latin *amerciare*, to fine). Legal term used in feudal times, but now obsolete. It was a fine imposed on an offender in lieu of the forfeiture of his goods. The

goods were declared at the mercy of the king, lord, or other legal authority. It was sometimes affeered or assessed by men of the neighbourhood, sometimes by custom. In the 12th century amercements were frequent and excessive, and in 1215, by Magna Carta, the amount of the fine was regulated, but had to be commensurate with the offence. *Consult* History of English Law, Pollock and Maitland, Vol. II, 1898.

AMERICA: AN INTRODUCTORY SURVEY

Herbert W. Horwill, Writer on American Affairs

This article deals broadly with the American continent as a whole. More detailed information is given in articles on the main divisions (North America; South America; West Indies, etc.), and the different countries (Argentina; Canada; United States, etc.)

America has been unfortunate in its name. The term is ambiguous and confusing. Though properly denoting the whole continent, it is more commonly used as a synonym for the United States, which constitute not much more than one-fourth of its area. Moreover, the name commemorates not the actual discoverer but a later and less important explorer, and even so recalls his Christian name instead of his surname.

There are traditions of visits to America by Norsemen in the 10th century, but it was undoubtedly Christopher Columbus who made the existence of the New World known to the Old. On Oct. 12, 1492, while seeking a new sea route to China and India, he sighted the Bahamas. On his third westward voyage, begun in 1498, he reached the mainland of South America. In 1497 John Cabot landed in what is now Canada. The claim of Amerigo Vespucci, a Florentine, to have been the first to set foot on the mainland of the continent is not adequately substantiated. Other notable dates are 1500, when Pinzon and Cabral severally reached Brazil; 1512, when de Leon was the first to explore the Florida coast; 1513, when Balboa (not Cortes, as in Keats's poem) caught a glimpse of the Pacific Ocean from "a peak in Darien"; 1520, when Magellan passed through the strait that bears his name; and 1535, when Cartier sailed up the St. Lawrence.

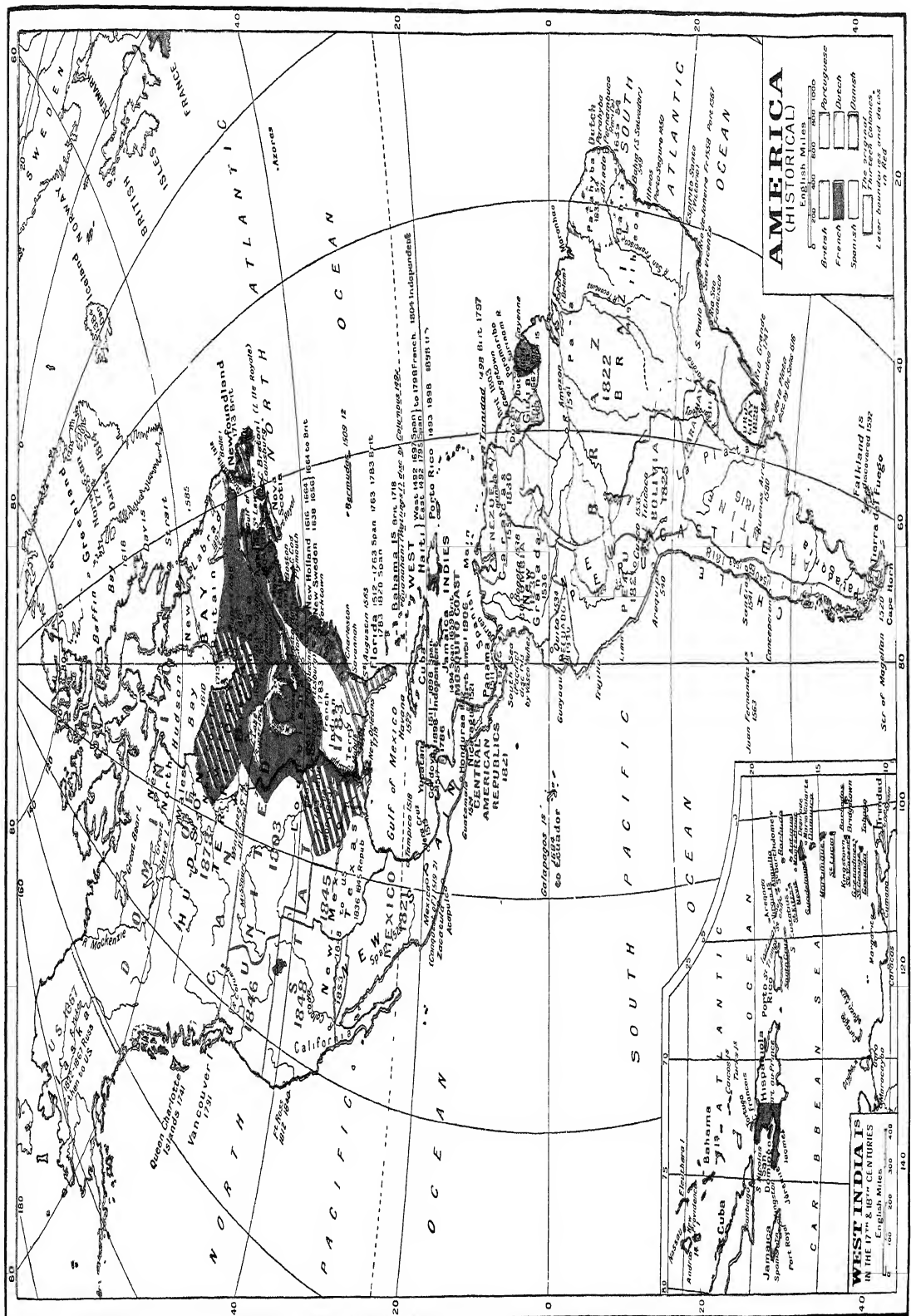
Little did these 15th and 16th century pioneers imagine what an immense difference their discoveries would ultimately make to the image of the globe. North America covers an area of 8,350,000 square miles; Central America (including the islands),

308,000; and South America, 7,047,000; making a total of 15,705,000. Thus North America alone is almost twice the size of Europe, and South America is more than $1\frac{1}{2}$ times its size.

Most of the physical features of America are sufficiently indicated by the map, from which it is obvious that many of them are on a large scale. In the Missouri-Mississippi it possesses the longest river in the world, stretching for 4,502 miles. This is closely followed by the Amazon, with its 4,000 miles. America possesses no single lake approaching the size of the Caspian, with its 170,000 square miles, but the so-called Great Lakes—Superior, Huron, Michigan, Erie, and Ontario—contribute the quite respectable total of 94,710, and thus constitute the second largest continuous stretch of fresh water in the world. Two cataracts in the Yosemite region head the list of the world's waterfalls in order of height, while Niagara, though far below many others in height and volume, is undoubtedly the most famous of all waterfalls.

Several mountain peaks in the Andes are excelled only by those of the Himalayas. Aconcagua rises to 22,976 feet, and seven other peaks in the same range exceed 20,000 feet. Then comes Mt. McKinley in Alaska, also above 20,000. The next three are Cotopaxi in the Andes and Mts. Logan and St. Elias in the Rockies, each above 19,000.

Of the climate it need only be said that America offers specimens of every variety of weather and temperature, as might be expected in a continent stretching nearly all the way between the two Poles. Special note should be taken, however, of the effect produced



In this map is rendered graphically the story of the discovery and acquisition by European powers of territory in the New World. By means of the dates in the different sections may be noted the rapid diminution of the French and Spanish empires, and the growth of the modern States.

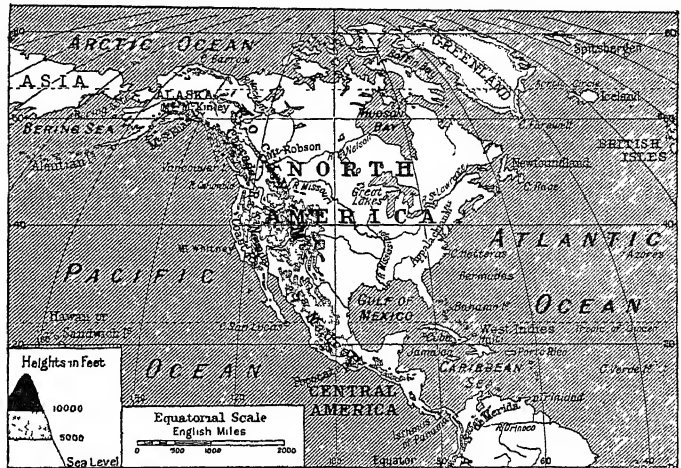
by the great mountain ranges upon winds and rainfall, and by the ocean currents upon the temperature of the coasts.

Geologically, too, America exhibits great variety. The north-east of the continent is formed of a mass of old, hard, crystalline rock called the Canadian Shield. The Appalachians are much older than the Rockies, and it is on their western side that great coalfields are found. Valuable oilfields occur on the flanks of both the Rockies and the Andes, and some districts of the United States and Canada are able to utilise wells of natural gas. Rich deposits of gold, silver, iron, copper, cobalt, and nickel exist in many regions, and the Pacific coastal strip of Chile has a flourishing nitrate industry. Useful timber is produced from the great forests of North America. Those on the Pacific slopes are notable for their giant sequoias and Douglas firs.

Early Civilizations

The earliest inhabitants of America known to history received the name of Indians because the first visitors from Europe supposed themselves to have reached the shores of India. They are also sometimes called Amerinds. They were of Mongolian stock. Their main physical characteristics were broad faces, moderate prognathism, shovel-shaped incisor teeth, straight black hair of round section, scanty beard and body hair, and dark skin ranging from yellowish to a coppery brown. They are believed to have arrived in the continent in small groups over a period of several thousand years, contemporaneous with the end of the Palaeolithic and beginning of the Neolithic periods in Europe. These primeval forerunners of the countless multitude of American immigrants came from the Pacific coast of Asia by way of Bering Strait and also from the Aleutian Islands.

In Mexico and South America, especially, some of them reached an advanced stage of civilization. The native cultures of the Incas, the Mayas, and the two Nashua nations of Toltecs and Aztecs may be compared to those of ancient Egypt and Mesopotamia. They have left memorials in the ruins of temples and palaces of a high order of architectural and mechanical skill. They developed a system of hieroglyphics, and manufactured paper and books. Their "codices" consisted of mythological and historical annals recorded in painted glyphs on



America. Map of the connected continent of North and South America, indicating the mountain systems along the western coasts

paper of maguey fibre. Their complicated calendar was based upon accurate astronomical observations. Some of these people were organized in an extreme form of communism under a ruling clan of reputed descent from the sun. In Mexico their religion was notable for its cruel human sacrifices carried out for the propitiation of their gods.

Linguistic relationships form the basis of the modern classification of these aborigines. About 75 linguistic families are recognized by experts among those of North America and 75 more in South America and the West Indies. The languages are mostly agglutinative, of the polysynthetic variety. There exists, of course, no certain knowledge of the number of the native population at the time of the discovery of America. Some estimates place it at as high a figure as 200 millions. Indians and people of partly Indian descent still constitute the bulk of the inhabitants of South and Central America. In the United States and Canada the proportion is much smaller. See American Indians.

European Settlers

The doom of native rule over a vast territory of America was virtually settled when Hernando Cortes landed in Mexico in 1519. Though he met desperate resistance from forces greatly outnumbering his own, his command of superior weapons of war enabled him to achieve within a few months the conquest of the powerful Aztec empire. In 1532 the invasion of Peru by Francisco

Pizarro brought a similar fate upon the empire of the Incas. Thenceforth, with the exception of Brazil, a colony of Portugal, the whole of South and Central America, together with a considerable portion of the North, became one of the richest provinces of the Spanish crown. Spain, however—and much the same may be said of Portugal—regarded her colonies merely as a gold mine to be worked by the inhabitants for her own benefit. The Spanish crown claimed one fifth of all produce.

This condition was tolerated for a long period in sullen submission, but in the early decades of the 19th century popular discontent broke into open and successful revolt in one country after another. This liberation from the foreign yoke was safeguarded by the promulgation in 1823 of the Monroe Doctrine, by which the United States declared that, whereas she would not interfere with the existing colonies or dependencies of any European power, she would not allow any European power to control the destiny of an American nation that had secured its

independence. Most of the freed nations immediately became republics. In many instances, though adopting the form of democracy, they lacked the substance of it, with the result that too often the government of the day obtained office through a military *coup d'état*.

Meanwhile the development of the continent to the north of Mexico had taken a very different course. The first English settlement, at Jamestown, Virginia, in 1607, was followed in 1620 by the landing of the Pilgrim Fathers at Plymouth Rock. From 1624 to 1664 New Amsterdam, now New York, was in the hands of the Dutch. The greater part of North America remained British until the Thirteen Colonies declared their independence in 1776, thus becoming the New World's first self-governing community entirely free from foreign control. Since that date the United States has made considerable important acquisitions on the mainland of the continent by purchase from Spain, France, and Russia. The authority of France in Canada, dating from the discoveries of Jacques Cartier, the French explorer, in the 16th century, came to an end, after a long struggle between that country and Great Britain, with the Treaty of Paris, 1763, by which Canada was ceded to the British.

Modern America

The present number of inhabitants of the continent is estimated at 170 millions in North America, 25 millions in Central America (including the islands), over 100 millions in South America. Its political divisions are as follows. In North America, in order of population, are the United States, Mexico, Canada with Newfoundland and Labrador. The isthmus forming the mainland of Central America is divided into the territories of the independent republics of Guatemala, Salvador, Honduras, Nicaragua, Costa Rica, and Panama, together with British Honduras. The islands of the West Indies include the Bahamas, Barbados, Jamaica, the Leeward Islands, the Windward Islands, Trinidad, and Tobago (British); Guadeloupe and Martinique (French); Curaçao (Dutch); Puerto Rico and the Virgin Islands (U.S.A.); and the republics of Cuba, Haiti, and Santo Domingo. The republics of South America are Brazil, Argentina, Colombia, Peru, Chile, Venezuela, Ecuador, Bolivia, Uruguay,

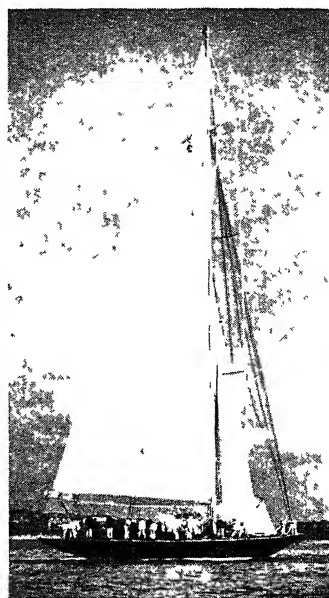
and Paraguay. Guiana is divided into British, Dutch, and French colonies, while the Falkland Islands are British.

From time to time demurring voices have been heard on either side of the border advocating the incorporation of Canada in the United States. Nothing, however, is likely to come of such propaganda while Canadians continue to prize their connexion with the British crown, involving as it does no impairment of their rights of self-government; or as long as politicians at Washington are doubtful whether the transformation of Canadian provinces into states of the Union would increase the Republican or the Democratic vote at Presidential and Congressional elections.

Even less probable is any federal union between the United States and the Latin American republics to the south. The Pan-American movement which has grown up in the 20th century has no such end in view. It means no more than a desire to cooperate in promoting such interests as all parts of the New World have in common. Latin America differs widely from the countries to the north of it not only in language, but in political, social, and cultural traditions and affinities and in national temperament and character. Moreover, not even the "good neighbour" policy of President F. D. Roosevelt helped to dispel the suspicions which many Latin Americans—not without some historical justification—entertained of "los Yanquis" as aspiring both to political domination and to commercial control over the rest of the continent. The series of Pan-American conferences, held from 1890 onwards, has, however, done much to improve mutual relations. Consult *The Rise of American Civilization*, C. A. and M. R. Beard, 1930.

America. In astronomy, a nebula so named because of its resemblance in shape to the continent of N. America. Among its features are a small intensely black hole, piercing what corresponds to the Isthmus of Panama, and a nebulous star off its New Jersey coast. Its light reveals itself fully only on the photographic plate. The elder Herschel had seen some indications of it, but its real discovery was made photographically by Dr. Max Wolf on a plate exposed by him, Dec. 12, 1890.

America Cup. Prize for an international yacht race, also



America Cup. Endeavour II, British challenger in 1936

called the America's Cup. It was originally named the Queen's Cup, and first offered by the Royal Yacht Squadron in 1851. Won over a course round the Isle of Wight by the U.S.A. schooner yacht America, and presented in 1857 by the owners of the winning boat



America Cup, yachting prize

to the New York Yacht Club, it has been known since as the America (or America's) Cup and held against all challengers. England sent over boats in 1870 and 1871, and Canadian yachts competed in the race in 1876 and 1881.

Later unsuccessful attempts to bring back the

cup were made by Great Britain with Sir Richard Sutton's Genesta in 1885; Lieut. Henn's Galatea, 1886; the Scottish boat Thistle, 1887; Lord Dunraven's Valkyrie II, 1893, and Valkyrie III, 1895; and Sir Thomas Lipton's yachts, Shamrock I, II, III, IV, and V, in 1899, 1901, 1903, 1920, and 1930. T. O. M. Sopwith's Endeavour lost to the U.S. Rainbow, 1934, and Endeavour II to Ranger, 1937. Most of the races in the U.S.A. have been sailed over a 30-m. triangular course round the Sandy Hook Lightship.



Christopher Columbus landing for the first time on American soil, as impressively depicted by a Spanish artist. It was in Oct., 1492, that Columbus first landed in the West Indies and in May, 1498, that he first reached the mainland
Painting by Dioscoro Puebla



Sailing of John and Sebastian Cabot from Bristol on their voyage of discovery to the West in 1497 when they reached the northern part of North America at Cape Breton Island, the eastern extremity of Nova Scotia
Painting by Ernest Board

AMERICA : EUROPEAN NAVIGATORS WHO DISCOVERED THE WESTERN WORLD

American. River of California, U.S.A. Rising in three headstreams in the Sierra Nevada, it flows S.W. through deep and narrow ravines to the Sacramento, near Sacramento city. Gold has been found on banks of its head streams near Folsom.

American Blight (*Schizoneura lanigera*). Common pest infesting apple trees. It is distinguishable by its dark slaty-brown colour and its white, fluffy, cotton-like covering. In small gardens it can be eradicated by scrubbing the affected trees with carbolie soap, but in orchards the trunks must be sprayed in winter with a mixture composed of carbonate of potash 12 lb., caustic soda 1 lb., soft soap $\frac{1}{2}$ lb., and water 15 gallons. Another remedy in specimen cases is brushing

or grooming with methylated spirit.

American Bloomery. Adaptation of the Catalan forge, used in the U.S.A. in the production of iron. The hearth of the furnace is rectangular in section and formed of thick cast-iron plates. The air blast is heated to between 500° and 800° F. by the waste heat escaping from the furnace. In working, the hearth is first filled with charcoal, more charcoal being added with the crushed ore from time to time. The lump of semi-molten iron gradually increases in size and at the proper moment is removed and beaten into the required shape under the hammer. To work off a charge producing 300 lb. or 400 lb. of metal takes three to four hours. See Metallurgy; Iron.

conditions, which made the South an agricultural region peopled by landowners and their negro servants, while the North was an industrial region in which traders and workmen from Continental Europe settled. Practical folk came to loggerheads about the tariff wall built up by the North for the protection of its manufactures, while sentimentalists bickered about the slave question, and the war was coloured throughout by these radical differences. The South produced brilliant generals and enthusiastic troops, including much cavalry; the North had the advantage in numbers of infantry, and in armament on both sea and land. The blockade and the munitions question, it was seen, would end the war in favour of the North, unless the South could quickly destroy its fighting power or provoke neutral intervention.

The war, then, is the story of how the Southern States, which had claimed their right to secede from the Union, resisted invasion by sea and land; how the Northerners, or Federals, recovered possession of what they deemed to be national territory, and how President Lincoln put down the rival president, Jefferson Davis, who had set up his government at Richmond, Virginia, within 100 m. of Washington. The struggle for supremacy between improvised forces was directed by officers who had recently served together under the Stars and Stripes, after being trained together at West Point.

The operations grouped themselves into two main theatres divided by the Appalachian Mountains (*q.v.*). In the E., the state of Virginia was the scene of nearly 600 engagements; in the W.—in

AMERICAN CIVIL WAR: 1861-65

G. W. Redway, Author of *The War of Secession*

The writer describes in broad outline the struggle between the Northern and Southern States. Further information will be found in articles on the various battles, e.g. Chancellorsville; Gettysburg; Shiloh, etc., and in the biographies of Lincoln, Grant, Lee, and others

This great contest, called by the victors the War of the Rebellion, raged for four years over the vast territory bounded by the Atlantic and the Gulf of Mexico, by the trans-Mississippi States, and by the Ohio and Potomac rivers. The theatre of war, about 1,500 m. from E. to W. and about half that distance from N. to S., embraced dense forests and cultivated plains, mountain ranges and valleys, sea coasts and sounds, lakes and rivers, bayous and swamps.

After the bombardment of Fort Sumter by the Confederates, or rebels, on April 12, 1861, no fewer than 2,260 battles, sieges, and skirmishes took place before General Kirby Smith surrendered the last of the Confederate armies on May 26, 1865. The North began the war with a professional army of 30 regiments, but ultimately put into the field over 2,000 regiments of volunteers, or nearly 3,000,000 men. Statistics of the Southern, or rebel, armies are not available, but about 100,000 men finally surrendered, and their estimated loss in the principal battles was about 442,000 of all ranks. The losses of the North amounted to 360,000 in dead alone.

The interest of this war to the English-speaking race has increased with the flux of time. In every great war the cause of hostilities, the army system adopted, the conduct of the war, the methods of fighting are all topics of concern, but usually discussion is hampered by want of reliable infor-

mation. The American Civil War, however, can be more closely followed than any war known to history, since the victors have frankly published the whole of the military documents in their possession at its close. In consequence, the Londoner, the Australian, and the Canadian may read in his mother tongue the dispatches of generals, the orders for marches and combats, the reports of spies, and even the messages transmitted on the battlefield by the "electric telegraph."

The political cleavage between the Northern and Southern States of America had its roots in climatic



First Reading of the Proclamation of Emancipation, September 22, 1862

Painting by F. B. Carpenter in The Capitol, Washington

Tennessee, Missouri, Mississippi, Kentucky, Arkansas, Louisiana, and Georgia—nearly 1,300 combats took place. Until the third year of the war the Southern generals, Joseph Johnston and Robert E. Lee, in Virginia and Maryland, opposed Generals McClellan, Pope, Burnside, Hooker, and Meade, while in the W. the Southern generals, Albert Johnston, Hood, and Forrest, operated against Generals Grant, Sherman, Thomas, and Rosecrans. Almost every campaign of the war has had its special historian, and the careers of brilliant subordinates, e.g., "Stonewall" Jackson, "Jeb" Stuart, Sheridan and Wilson, have been set forth in elaborate biographies. Here it is only possible to outline the tremendous struggle on land, while the Federal navy patrolled the coast and the great waterways to prevent supplies reaching the Confederates by sea from Europe or overland from Mexico, in exchange for cotton and tobacco.

In 1861 the battle of Bull Run opened the war in the E., and the defeat of the Federals there on July 21 resulted in the formation of a large army, which in the spring of 1862 was landed on the Yorktown Peninsula, with the object of capturing Richmond, the Confederate capital. McClellan fought his way to the Chickahominy in May, 1862, but dallied there until he was attacked in succession by Johnston and Lee, and driven back to the James river, where he found support from the Federal navy. The remnants of his army were taken to Washington, and the general was dismissed.

Meanwhile, in the W., Grant had acted aggressively and with success against the rebels in the region where the Ohio flows into the Mississippi, and Belmont, Fort Donelson,



American Civil War. General Grant (seated third from left) and members of his staff at their headquarters at City Point
From a contemporary photograph (1864)

and Shiloh cost the Confederates 27,000 men and an able leader. Albert Johnston.

President Lincoln now formed a new army under General Pope to advance on Richmond overland, but General Lee met this force at Bull Run at the end of August and drove it back into Washington. He then crossed the Potomac and invaded Maryland, a movement which made the Federals fear for the safety of their capital. McClellan was again placed at the head of the army, and he succeeded in expelling Lee from Federal territory after the battle of Antietam. But his propensity to halt just when the Government looked for vigorous pursuit again caused his supersession, and General Burnside now took command of the Army of the Potomac. Burnside manoeuvred

to gain the road to Richmond by crossing the Rappahannock at Fredericksburg, where he was defeated by Lee in December. The year closed with a Federal success in Tennessee, at Stone's river, after the capture of Corinth rly. junction.

In 1863 General Hooker attempted to gain Lee's left flank at Chancellorsville, but fared no better than his predecessor, Burnside, and again Lee invaded Maryland. At Gettysburg, 70 m. N. of Washington, the Confederate leader met with a serious defeat at the hands of General Meade, who had succeeded Hooker, and this Confederate reverse in the E. was aggravated by the loss of Vicksburg, on the Mississippi, and by other defeats at Chattanooga and Chickamauga, on the river Tennessee. From this date fortune turned steadily against the Confederate cause. In 1864 the War Council at Washington brought General Grant to the E., and gave him control of all the Federal armies in order to finish the war.

Grant realized that he must conquer Lee, who was the principal figure in the war. He enunciated a doctrine of attrition, and said, on taking the field in Virginia, "he would fight it out on this line if it took all summer." He fought, at the Wilderness, at Spottsylvania Court House, and at Cold Harbor, battles which cost him 45,000 men, but he repaired his losses, and invariably operated to gain Lee's right flank and secure supplies and reinforcements by water. At the end of June he crossed the James river, to approach Richmond from the S., but Lee by a shorter road met him at



American Civil War. Confederate lines at Atlanta, Georgia, occupied by Union troops after the retreat of General Hood
From a contemporary photograph



American Civil War. Battle of Gettysburg, July 1-3, 1863, when the Confederates were defeated by the Army of the Potomac, under General Meade

After Wenderoth

Petersburg. Then there ensued a species of siege. But Grant had left an able leader in the W. in General Sherman, who was steadily clearing the state of Tennessee and in September had reached Atlanta, in Georgia, with the ultimate intention of joining hands with Grant and attacking the rear of Lee's fast dwindling forces. The fall of Nashville in December resulted in 15,000 Confederate prisoners.

In 1865 the Confederate Government at Richmond was in danger of losing its communications with the S. and the W., from which points only could supplies arrive, when Grant set his army the task of breaking up the South Side and Danville railways. This proved to be the beginning of the end. Lee's tenacity in holding the lines of Petersburg, which cost Grant 27,000 men in nine months, could not avail to win the campaign. For nine months Lee had repulsed every attempt to force him from his works, but in April, 1865, the remnants of his fine army were in dire need of food and ammunition and he abandoned Petersburg to march W. and meet a supply train at Lynchburg. For this movement, however, Grant had prepared, and a mass of cavalry under Sheridan headed off the retreat at Appomattox Court House, where Lee, unable to cut his way through, offered his sword to his conqueror. His subordinates in the W. held out for a few weeks.

The work of the Federal navy should not be overlooked. As Mahan points out, the blockade of the Confederate ports was a purely strategic operation, "a steady and strangling pressure upon the enemy's lines of com-

munication, with the result of producing exhaustion through the failure of necessary resources." But for two years the Confederates held their own at sea, and blockade runners flourished. The famous Alabama sailed from the Mersey to become a commerce destroyer, and the depredations of a dozen such cruisers, whose origin was traced to Great Britain, gave rise to the Alabama claims, which cost Great Britain three million pounds to settle. The tactical operations at sea were also of interest. The newly invented ironclads, Monitor and Merrimac, fought in Hampton Roads for the command of the York and James rivers before McClellan's army could be moved from Washington.

But Federal monitors found they could not prevail against

mounds of earth and sand, which protected the coast batteries, and Admiral Dupont's squadron was disabled after an hour's engagement at Fort Sumter, near Charleston. Naval attempts to control the Mississippi failed until Grant's land operations secured Vicksburg. A naval expedition up the Red river to Shreveport was intercepted by obstructions at Alexandria Falls. The vessels, thus imprisoned 200 miles from blue water, were only extricated by the labours of an infantry brigade composed of Maine lumbermen. The mouth of the Sabine river was found unapproachable, and two Federal gunboats, subdued by the forts, there hauled down their flags. The Confederates may be credited with the first submarine, as well as the original ironclad, for the David, in Feb., 1864, outside Charleston harbour, passed under the keel of a Federal corvette, dragging a floating torpedo, which exploded on striking the blockading vessel.

When the Confederates evacuated Charleston on the approach of Sherman's army from the W., the invaders found a small fleet of rams and torpedo-boats in various stages of completion. But the Federal blockade had then been effective for two years, and, gradually destroying the contraband commerce of Charleston, had diminished its military value to the Confederates. In 1865 no fewer than forty harbours, inlets, and channel-ways had been closed to the outer world. The importance of the great waterways as internal communications during the war is shown by the fact that the larger armies were known by the names of these



American Civil War. The end of the conflict. General Lee's surrender to the Federal leader, General Grant, at Appomattox Court House, Virginia, Apr. 9, 1865

From an old print

ivers, e.g. the Army of the Cumberland, of the Tennessee, of the Ohio, of the Mississippi, of the James, and of the Potomac. The proclamation declaring the war at an end was sent out on April 14, the fourth anniversary of the evacuation of Fort Sumter.

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American Cloth. Glazed textile fabric used for covering chairs, tables, desks, carriages, etc. The fabric is usually cotton, coated with a composition which dries with a flexible leather-like surface. Linen is used for the stronger kinds. The surface is sometimes grained and sometimes smooth.

American Federation of Labor. Senior of the two great U.S. labour organizations, the other being its offshoot and rival, the Congress of Industrial Organizations (C.I.O.). Founded in 1881 largely on the initiative of Samuel Gompers, who was president from 1882 for most years until his death in 1924, the Federation is an association of labour unions in the U.S.A. and Canada, chiefly unions of skilled craftsmen; in 1938 it comprised 102 national and international unions, 1,517 local trade unions in the U.S.A. and Canada, 49 state federations and 792 city central bodies, with a membership of 3,623,087. During the Second Great War its membership rapidly increased, and in 1944 it reached 6,806,913. The Federation prefers collective bargaining to strike



American Civil War. States and territories at the period of the conflict, showing the relative extent of country represented by the would-be seceders of the South (Confederates) and by the Federals of the North

action, and believes in raising the workers' standard of living within the framework of capitalist society. It is in friendly relation-

ship with the British T.U.C., but declined to join the World Federation of Trades Unions in 1945.

AMERICAN INDEPENDENCE: THE WAR OF 1775-83

Professor G. M. Wrong

In this article is given the history of the war from which Britain's American colonies emerged as the United States of America. For connected subjects see articles on Bunker Hill, Yorktown, and other engagements; also those on Washington and other leaders

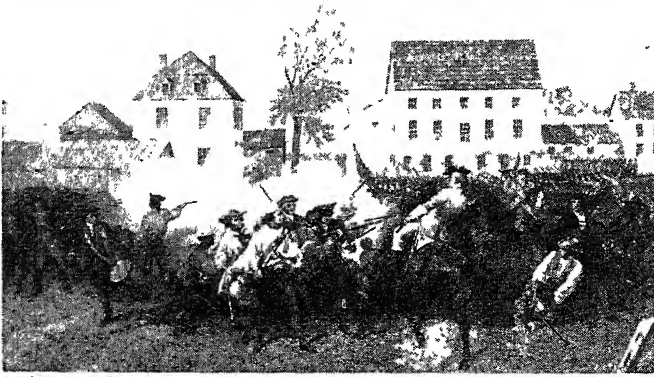
The Seven Years' War, which ended in 1763, left Great Britain with a load of debt. The landowners, who dominated Parliament, were restive under the heavy tax on land and insisted that the English colonies should pay at least some of the cost of the army still kept in America. A considerable revenue was raised in England by the sale of stamps necessary to validate certain business papers, and it was decided to try this mode of taxation in America. The House of Commons passed the necessary resolutions Feb. 5, 1765, and at once two opposing tendencies met in sharp conflict.

In England George III led the ministry in the policy of organizing and controlling the great empire recently increased by victorious war. In America, on the other hand, populous colonies more than a century old, feeling strong in national life, resented any interference in their domestic affairs. They held that it was for them, and not for the British Parliament, to determine what taxes they should pay.

The Stamp Act was soon repealed. The ministry which passed it was driven from office before

the Act ever came into operation. Repeal in 1767 was, however, accompanied by a Declaratory Act asserting the full authority of the British Parliament over the colonies. The landlords continued to press for relief from taxation. It was easy to understand the objection of the colonies to taxation directly touching their internal affairs. They admitted, however, the right of Great Britain to control their external trade, and this control served to cover duties on goods entering the country.

In 1767, therefore, acting on this hint, a new chancellor of the exchequer, Charles Townshend, led the House of Commons in imposing a duty on glass, lead, painters' colours, paper, and tea. At once the colonies again raised vehement protests. It was unanimously resolved to use no English goods and to pay no debts in England until the Act was repealed. A new ministry, that of Lord North, coming into office in 1770, repealed the duties, retaining only that on tea, to assert an abstract right. The trouble in regard to this duty became acute a little later when, to get rid of surplus stock, the



American Independence. Battle of Lexington Common, April 19, 1775, when General Gage, on his way to Concord, defeated the local militia
From an old print

East India Company sent many cargoes of tea to America. It was thought the colonies would feel no grievance; they would pay three pence a pound, while the British consumer paid a shilling, but this forecast proved incorrect.

The real problem was one of political right, and a succession of unpleasant incidents aroused an obstinate temper on both sides. The British Ministry enforced unpopular restrictions on colonial trade. In 1770 a Boston mob attacked British soldiers in the street and the troops fired, with fatal results. In 1772 citizens of Providence, Rhode Island, burned a small British war vessel, the *Gaspee*, which ran aground there and had caused resentment by her efforts to stop illegal trade. In 1773 a party disguised as Indians threw into Boston harbour 340 chests of tea about to be landed from British ships.

Trouble came also from another direction. In 1774 there was a great clamour in the colonies when the British Parliament passed the Quebec Act. It offended colonial thought by its liberality to the Roman Catholic Church in Canada, and it placed the vast hinterland N. of the Ohio as far as the Mississippi under the rule of a despotic military governor at Quebec. The bill, it was said, menaced the liberty and the expansion of the colonies. The climax came when the British Parliament, as a penalty for the riotous incidents in Boston, passed in 1774 a bill closing the port of Boston until it should make amends. General Gage was made governor of Massachusetts, and had at hand a large military force.

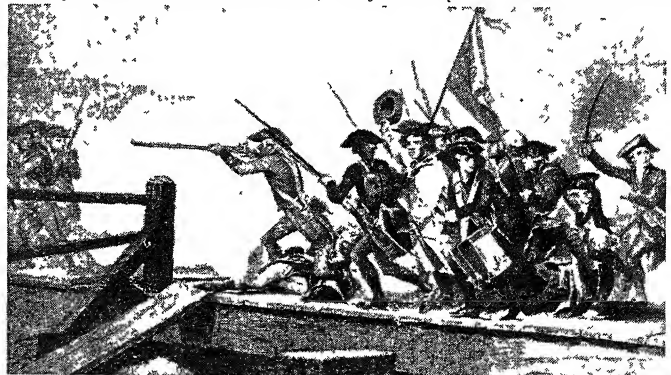
War was now near. With Massachusetts and Virginia leading, a Continental Congress gathered at Philadelphia in the autumn of 1774 to unite the colonies in action.

General Gage saw that Massachusetts was preparing to fight, and on April 19, 1775, he sent out a force from Boston to Concord to destroy military stores collected there. At Lexington the column was attacked by armed farmers and, after effecting its purpose, returned to Boston only under a galling fire. Gage now found himself besieged in Boston. In May the second session of the Continental Congress began at Philadelphia. It made the cause of Massachusetts its own, and on June 15 it appointed Colonel George Washington of Virginia to the command of the colonial forces. While on his way to Boston he received the news of the battle of Bunker Hill. On June 16 the Americans had occupied Breed's (not Bunker) Hill overlooking Boston, and when on the next day Gage dislodged them, the effort had cost him 1,000 casualties in an attacking force of 3,000.

Washington now planned aggressive war. To make the union continental he thought it necessary to occupy Canada. Already in May, 1775, a Vermont leader,

Ethan Allen, had seized Fort Ticonderoga, commanding the route by Lake Champlain to Montreal, and in the late autumn the Americans held the St. Lawrence, with the British garrison under Sir Guy Carleton shut up in Quebec. The sea route to Quebec, however, remained open, and the arrival of a rescuing fleet in the spring of 1776 led to the entire withdrawal from Canada of the American forces. As early as March, 1776, the British evacuated Boston and sailed away to Halifax. Sir William Howe succeeded Gage in the command, and had a bold plan to seize New York and Philadelphia, cut off the North from the South, and conquer the sections in turn. By the middle of Sept. he was in possession of New York after defeating Washington in the battle of Long Island. No reverse, however, could shatter the resolve of Washington to fight on. Congress on July 4, 1776, had adopted a Declaration of Independence, a step which made retreat finally impossible, and its policy now was to make an alliance with France.

Washington's sense of the danger from Canada was justified when a British army under General Burgoyne gathered there and in the summer of 1777 invaded the state of New York by way of Lake Champlain. Had Howe advanced up the Hudson from New York to join Burgoyne, they might have cut off New England from the other colonies. Both leaders were, however, under the control of the English minister, Lord George Germain, and he had not instructed them to cooperate. While Burgoyne invaded New York, Howe was planning to take Philadelphia. In Sept. he threw his force against that place, defeated Washington at the Brandywine, and occupied the city on Sept. 26. The real crisis



American Independence. Rout of the English on Concord Bridge, April 19, 1775, the momentous episode which preceded the siege of Boston
From an old engraving



The signing of the Declaration of Independence, July 4, 1776, by which the thirteen states of America broke their allegiance to Britain. It was seven years later that Britain recognized the independence of the United States
From a painting by Trumbull



Cornwallis in Yorktown, where he was besieged in 1781 by the forces of the Americans on land and by those of the French at sea. It was the last important battle of the war, Cornwallis having to surrender to Washington
From an old painting

AMERICAN INDEPENDENCE: TWO OUTSTANDING INCIDENTS IN THE WAR OF 1775-83



American Independence. George Washington making his entry into New York after the close of the war in 1783

From a contemporary print

was, however, elsewhere. On the Hudson Burgoyne was in difficulty, and on Oct. 17, with 6,000 men, he surrendered to General Gates at Saratoga. This British disaster was irretrievable. On hearing the news, France, on Feb. 6, 1778, signed a treaty of alliance with the Colonists.

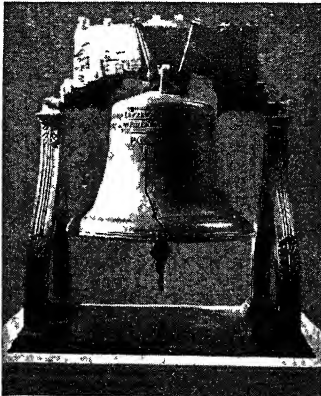
On the surface, however, the American cause fared ill after the fall of Philadelphia. Congress was driven from that place, and had no ministers or departments for the effective organization of war. Washington's army spent the winter of 1777-8 at Valley Forge under distressing conditions. None the less, the entry of France into the war forced a new policy upon the British. They decided to abandon extensive campaigns by land, to concentrate at New York, and to use their naval power in coast raids with a view to wearing out the enemy. Accordingly, in June Howe evacuated Philadelphia and marched across New Jersey to New York, harassed on the way by Washington and fighting the battle of Monmouth on June 28, 1778. With his chief post on the Hudson, Washington was able to check any advance to the interior.

A long period of inactivity followed, and the spirit and resolve of the Americans declined. Sir Henry Clinton succeeded Howe as British commander. In 1780 General Benedict Arnold, in command at West Point, was about to hand over that place to Clinton when the plot was detected. The treason showed how hopeless the American cause seemed in the eyes of one of its leaders.

▲ The South, divided in opinion, offered a promising field for British effort. In Dec., 1778, the British

occupied Savannah, Georgia, and in the next year overran that state. In May, 1780, they took Charleston, S. Carolina, a seaport as important to them in the South as was New York in the North. Lord Cornwallis, a really able general, defeated General Gates, the victor at Saratoga over Burgoyne, at Camden, South Carolina, on August 16, 1780. The whole South, to the borders of Virginia, was soon in British hands.

The aggressive policy of Cornwallis seemed to be justified. He met Greene, Washington's best general, at Guilford Court House, North Carolina, on March 15, 1781. The battle was drawn, but Cornwallis, relying on reinforcements by sea from New York, pressed on into Virginia. To master it was to gain the whole South; not to master it was to fail elsewhere. He overran a great part of the state. Greene, however, slipped past him



American Independence. The Liberty Bell which rang for the declaration of American Independence. It is kept in Independence Hall, Philadelphia

and entered upon a victorious campaign. In April he fought an engagement at Hobkirk's Hill and in Sept. one at Eutaw Springs and the result was that, after severe fighting, he had recovered most of the south and Cornwallis was confined to the district between the rivers York and James.

Washington's keen eye detected the weakness of Cornwallis's position. His support from the sea was insecure, for Holland and Spain had entered the war and with France were menacing Britain in the West Indies, so that her fleet was divided. Cornwallis made his headquarters in Virginia at Yorktown, an exposed position lying near the mouth of the York river. A French fleet under De Grasse cut off rescue by sea, and Washington closed in on Yorktown from the land. The masterly combination meant surrender or destruction, and on Oct. 19, 1781, Cornwallis surrendered with an army of 7,000 men. The disaster ended the war.

Negotiations for peace were soon begun, and in Nov., 1782, a provisional treaty was signed in Paris. Washington then declared hostilities at an end; on Sept. 3, 1783, the final treaty was signed, and the British evacuated New York, their last stronghold. The treaty recognized the independence of the thirteen states, and to the United States which they formed was given the sovereignty of the vast region between the Allegheny Mts. and the Mississippi. Other provisions adjusted differences between Great Britain on the one hand and France and Spain on the other. (See Paris, Treaties of.)

The American War of Independence influenced profoundly the whole western world. The Whigs in England said that the struggle was between reaction and advance. They rejoiced at American victories. Coke of Norfolk, a great Whig landowner, toasted daily at his table the cause led by Washington. Though the loose union of the thirteen states for war broke down on account of corruption and inefficiency, it yet led to a new federal constitution in 1787 under which the republic is now governed.

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American Indians. The original inhabitants of the American continent, both N. and S., are usually known as American Indians. The name Indian was given to them about 1493 by Columbus, who imagined he had reached India, when he was in reality in America. It has persisted, although the Indians, especially those of N. America, are sometimes known from their colour as Redskins, or Red Indians, and the contraction Amerind has been suggested as a substitute.

The balance of available evidence points to the arrival of American man in quaternary times from Asia, perhaps over a broad land-bridge extending across the Pacific as far S. as British Columbia. At the outset a dwarfish, wavy-haired, long-headed race may have worked down the Pacific margin into S. America, where it is still traceable in the Botocudos. A straight-haired, long-headed stock may have crossed with the reindeer, to survive in the Eskimos. A third stock, also straight-haired, but medium-headed or round-headed, arriving perhaps in two independent waves, may account for the Algonquins and the Athapascans. When these racial streams came, the N. slope of Asia was peopled by a generalised type, wherein the distinctive Mongolian characters were still in the making. Later other streams, more definitely Mongoloid, may have followed the same path.

Development of Aboriginal Culture

All these ethnic elements have been moulded into a general American type, which is entitled to be ranked as a sub-race. They brought into their new home that stone-age culture which preceded animal domestication (apart from the dog), cereal cultivation, and ore-smelting. Except the Eskimos, they were, and continued to be, lampless. Their primitive endowment was developed in a geographical environment embracing the habitable Arctic and the whole width of the temperate zones with the tropics between. Two important contact-periods introduced new impulses. One, from the W., was mainly cultural, and exerted recognizable influences, especially upon the ancient civilizations of the table-lands. The other, from the E., was racial as well, and was inaugurated by the arrival of Columbus in 1492. Except for the one, and until the advent of the other, America developed its aboriginal culture for the most part in isolation.

The palaeolithic immigrants spoke languages of a type hardly divergent

from the primeval forms of speech. This type is called holophrastic (Gr. *holos*, whole: whole-phrased), each sentence being a single verbal unit. American languages are still fundamentally holophrastic, although some have assumed marked polysynthetic forms. Almost every tribe—and the number exceeds 1,500—has its dialect, but much is being done towards their classification. Powell grouped those N. of Mexico into 58 linguistic families, a number since reduced, but only half-a-dozen are widely spoken.

Regional Classification

Neither race nor speech, however, offers a satisfactory basis for studying American ethnography. The merest glance at a contour map of the continent, and at one showing the animal and plant distribution, prepares the inquirer for wide diversities of culture. The material environment varies with the geography, and this affects the character of the arts and customs. Hence the most serviceable classification is a regional one, and a simplified arrangement is appended to the end of this article. The mt. chain extending from N. to S. is the most potent factor in the cultural distribution. In each half of the continent it marks off a region facing the Pacific from another facing the Atlantic. These two pairs of lateral regions are connected by a central region in middle America, and embraced at the outer ends by an arctic and an austral region respectively. In the appended list the prevailing ethnic characteristics of these regions are briefly indicated, together with the names of the principal tribes.

The study of aboriginal culture in America has its historical no less than its geographical aspect. The aboriginal life of the last four centuries involves two main elements, which respectively concern its history before and after contact with European culture.

The most constant physical characteristic is the lank, black hair. This, combined with the high cheek-bones, attests Asian origin. The sloping forehead, marked brow-ridges, especially in some long-heads, deep-set, dark-brown eyes, and broad-based straight or aquiline nose might be called pre-Mongolian or, better still, unspecialised. The skin colour is a coppery brown rather than red, paling into yellowish tints, especially in the south. Brave and reserved, indolent yet impatient of restraint, vain yet impassive, hospitable yet vindictive, the Amerind intelligence resembles in

some measure the Mongolian, and the differences are explicable by the different continental conditions.

The coastal, mountain, and forest tribes lived by the chase supplemented by wild vegetation. The means of locomotion were developed out of the food-quest. The Eskimo dog-sled, a remote invention, and borrowed by the Algonquins and Athapascans, was the only animal transport, except the Andean llama, before Columbus. So also the Eskimo sealskin canoe became a birch-bark canoe farther S. The dugout developed independent Pacific and Atlantic forms. In Californian waters rafts of bundled rushes represent navigation in its beginnings. The Sioux women used bison-hide coracles. All these craft, even the great seagoing pirogues of the Caribs, were paddled; the sail came afterwards from over sea.

Except the Andean alpaca and the Mexican turkey, animal domestication for flesh, milk, and egg food hardly existed. Before the arrival of Columbus cereal cultivation was represented by maize; the ancient civilizations also utilised cotton, tobacco, cacao, and the potato. In the plains and pampas the introduction of the horse and domestic cattle modified the externals of tribal life, without lifting its social institutions from savagery.

The Useful Arts

The local technology, developed out of a palaeolithic foundation, reached the art of polishing, but without the associated culture of the neolithic age in Europe. Chert and obsidian, nephrite (jade) and soapstone, were skilfully manipulated. Shell and bone implements were everywhere of high importance. Typical weapons of the chase are the bow, blowgun, and bolas. The spear-thrower is doubtless primeval. Basketry gave rise to coiled and other pottery forms, but the potter's wheel was never reached. Europe owes to aboriginal America snow-shoe and moccasin, toboggan and poncho, hammock and pemmican, tapioca and quinine. Decoration, always symbolic in origin, was applied to leatherwork, painted skins, basketry, weaving, and pottery. Animal motives prevailed. Graphic art tended towards record and communication; hence the pictorial annals preserved by the Dakotas in the so-called winter-counts.

The forms of the dwellings illustrate the level of family life. Between the Fuegian wind-shelter and the Eskimo sealskin tent lie the buffalo-skin tipi and bark wigwam of the plains, the forestal

leaf-hut, the Guiana pile-house, the Pawnee earth-lodge, the Bororo bachelor-hut, the clustered adobe houses of the Pueblos, and the massive architecture of Mexico and Peru. The art of burning bricks was never attained.

Social Institutions

At the time of the discovery the system of clans in which the woman and not the man was the dominating link was giving way in some tribal groups to the opposite system. The Hurons lived in long houses of interrelated families with a matron in charge. The separate family dwelling was rare. Polygamy, where permissible, was in practice limited by ways and means; many tribes are essentially monogamous. Prudential infanticide was practised here and there. Every clan had its totem name, but, except in some N.W. tribes, the totem system as a means to exogamy was less rigid than in Australia. Taboos usually had an exogamous purpose.

Tattooing, although less general than body-paint, was widely spread. This, as well as head-deformation and some other mutilations, probably came across the Pacific. The commoner form of head-flattening was accomplished by pressing cradleboards upon the forehead, as among the Choctaws; a rarer form produced a conical occiput. Initiation frequently involved torture. A poultice of living ants is used in the Amazon forests; red pepper is rubbed into the punctured backs of Carib girls; some young Algonquin braves were lashed to posts by thongs passed through incisions in the breast.

In the hunting communities tribal life tended to retain the primitive form of control by the elders. The confederacies of the N. plains recognized the hereditary principle in the election of chiefs, who among the Iroquois owed their position to the choice of the women. Agricultural land and hunting grounds were held in common by the tribe. On this account the so-called "nations" never reached the form of settled states, except so far as this term applies to the ancient civilizations.

Issues of peace and war were determined at tribal councils, whereat calumet and tomahawk were ceremonial accessories which have given rise to the phrases "the pipe of peace" and "burying the hatchet." In the Iroquois and Muskogee region enemy scalps, as trophies of war, were sometimes mounted on poles for the women's scalp-dances. Wampum comprises strings of shell beads used for orna-

ment and currency, which when formed into belts served as treaty records.

The universal tendency of the dead betokens, with one or two dubious exceptions, a belief in a life beyond the grave. A widespread custom was to enclose the unburned remains in baskets or urns. Cremation was rare, and, apart from the Aztecs, human sacrifice also. The primitive animism brought from Asia developed less into ancestor-worship than into nature-worship. Almost everywhere is found an order of spirit-mediators, usually called shamans, although American shamanism differs radically from the Asian. Some of these mediums discharged the functions of medicine-men as well.

Symbolic dancing was prevalent. Ceremonial halls or medicine-lodges are common throughout the N. The sweat-houses of many tribes had a ritual origin. Drums and rattles were the chief musical instruments; woodwind got as far as the rare whistle and flute, strings as far as the rarer musical bow. The Siouan buffalo dance, the Iroquoian corn dance, and the sun dance of the plains generally were magico-religious manifestations. The Hopi snake dance is a rain-making rite. A universal belief in a Great Spirit is wrongly attributed to N. America. There is a copious mythology of creation legends and explanations of natural phenomena. In 1918 G. W. Cronyn produced a volume of aboriginal American verse entitled *The Path on the Rainbow*, an anthology of songs and chants from the Indians of N. America.

The Present and the Future

At the discovery in 1492 the population N. of Mexico is estimated to have been 1,150,000. The present number, apart from the Eskimos, is (1941) 118,316 in Canada and (1943) 376,580 in the U.S.A. Mexico (1940) returned 4,620,880. The number for Central America is put at 9,400,000, for S. America 4,851,000. European and negro immigrations have led to much mixture of races, and this mixed element is a significant factor in the politics of Latin America. The N. American tribes have been plied by the Canadian and the U.S. governments for the most part in reservations. Although some are dying out, the total is thought to be increasing. Outstanding men, e.g. Hiawatha, Pontiac, Red Cloud, and Tecumseh, have been prominent in history, not to speak of the Aztec and Inca dynasties. Tammany, a Delaware sachem, is immortalised in a po-

litical nickname; a Zapotec, Benito Juarez, was president of Mexico. But the Amerind character lacks the quality of racial permanence in the presence of the more versatile ability of the white race.

CLASSIFICATION OF AMERICAN INDIANS. Arctic: Long-headed, short (5 ft. 2 ins. to 5 ft. 4 ins.). Eskimos, Aleuts.

N. Pacific slope: Round-headed, medium (5 ft. 6 ins.). Haidas, Tlingits, Nootkas, Tsimshians; Kwakiutis, Salishes.

N. Atlantic slope: Medium-headed, medium to tall (5 ft. 6 ins. to 5 ft. 9 ins.). Algonquian: N., Algonquins, Crees, Ojibwas (Chippewas); W., Blackfeet, N.E., Micmacs; E., Mohicans, (Mahicans, Mohegans). Athapascan: N., Athapascans, Chipewians, Hares; W., Hupa; S., Apaches, Navahos. Beothukan: Beothuks. Caddoan: Pawnees. Iroquoian: Iroquois (Cayugas, Oneidas, Onondagas, Senecas, Hurons), Cherokees, Mohawks, Tuscaroras. Muskogian: Muskogees, Creeks, Seminoles; Chickasaws, Choctaws; Natchez. Shoshonian: Shoshoni, Comanches, Utes; Hopi. Siouan: Sioux, Assiniboins, Dakotas, Blackfeet. Zunian: Zuni; Pueblo Indians.

Central: Round-headed, short. Shoshonian: Nahua, Aztec, Pipils. Sonoran: Opata, Pima, Huichols. Huastecan: Huastec, Maya, Queche, Toltec, Totonaec, Chontal and Lacandons. Otomi, Seri; Mixtec, Zapotec, Tarascan; Chorotegan; Nicarao; Sumo-Mosquito.

Andean (S. Pacific slope): Round-headed, short. Chibcha, Guetar, Talamancan, Quichua, Inca, Aymara, Calchaqui.

Forestal (S. Atlantic slope): Round-headed and medium-headed, short. Carao, Caribs, Tupi, Guarani, Guayanos, Cocamas, Omaguas, Umuas, Chiriguano, Chiquitos, Mojos, Panos, Carapunas, Cashibos, Conibos. Arawak, Anti, Warrau, Tacanas, Araunas, Jivaros. Guaycurus, Matacos, Mbayas, Abipones, Tobas; Charruas. Tall: Bororos. Long-headed: Botocudos, Aymores, Tapuya.

Austral: (a) Pampean: round-headed, short. Araucanians, Puelche, Pampas Indians. (b) Patagonian: round-headed, tall (5 ft. 10 ins.). Tehuelche (Patagonians). (c) Fuegian: medium-headed, short (5 ft. 2 ins.). Alakalufs; Onas; Yahgans.

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This Sioux chief, wearing a feathered headdress of immense size and carrying a pipe which is also an iron-headed tomahawk, is an embodiment of the pride of race which is still predominant among the surviving North American Indians

AMERICAN INDIANS: A SIOUX CHIEFTAIN AND HIS SQUAW

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1. Ute Indian with his squaw and their papoose. 2. A Shoshonean Indian with his squaw. 3. Woman of the Isleta Pueblo or house-building Indians of New Mexico. 4. An Ojibwa, or Chippewayan, of the great Algonquin stock

AMERICAN INDIANS: TYPICAL REPRESENTATIVES OF THE REDSKIN RACES

Americanisms. According to the great work of Noah Webster, the Samuel Johnson of American lexicography, an Americanism is "a linguistic usage, especially a word or phrase, peculiar to English as developed in the United States." This definition, despite its high authority, is too narrow. For development implies growth, and some locutions generally recognized as Americanisms are examples not of progress but of stagnation. When an American declares that he has gotten a new secretary, or that he likes his meat rare, or that he is going abroad in the fall, he is not moving on, linguistically, but standing still. He is speaking the English of the Pilgrim Fathers. A list of linguistic usages now obsolete in England but still flourishing in the U.S. would run into scores.

Conservatism, however, is far from being the dominant note in American speech. A great many English words have suffered an entire change of meaning through crossing the Atlantic. Examples may be found in every department of human life and activity, e.g. apartment, first floor, porch, piazza, transom, davenport, dumb-waiter; boot, shoe, vest, suspenders, calico, broadcloth, muslin, haberdashery; lunch, dessert, corn, biscuit, doughnut, pie, cakes; public school, preparatory school, faculty, recitation; billion, hundredweight, penny; whig, tory, bill of rights, board of trade, premier, sheriff, franchise, secret service; transportation, right of way, caboose, wing (of car); jail delivery, penitentiary, brief (legal); city editor, cowman, solicitor, lifeguards, redcaps.

English visitors to the U.S. have to beware of pitfalls lurking in the changed meaning of other words which do not fall into groups, e.g. corporation, frontier, gait, guy, homely, majority, pavement, saloon, workhouse. Misunderstandings also frequently arise through differences in connotation. There is a distinction between the English and U.S. uses of the words colonial and politics.

New Words

Then they find in the American vocabulary a multitude of words that are quite strange to the ordinary Englishman. Not all of them are the product of American inventiveness. Some, especially those denoting natural objects unfamiliar to immigrants from Europe, were picked up from the speech of the natives: such as

hickory, persimmon, and squash. The various nationalities that have contributed to the American stock have left a few traces on the language, e.g. the Dutch stoop (steps leading up to the front door), the Spanish canyon, the French interne, and the German delicatessen.

The linguistic independence of the U.S. was declared long before her political independence, and the process of coining new terms is still being vigorously carried on. The additions to the vocabulary of everyday life are of infinite variety. They include, for instance, car barn, commutation ticket, contraption, custom suit, derby hat, disgruntled, dry goods, floorwalker, go-getter, gunman, handscrib, hobo, notion counter, office-holder, once-over, pan-handler, pop-eyed, prince albert, pushcart, pushpin, roomer, rough-house, sculduggery, sea-food, selectmen, shade-tree, side-check, slingshot, station agent, sunburst, tenderloin, trial lawyer, tuxedo, and windsor tie.

Vivid Metaphor

An outstanding feature of American speech is its wealth of metaphor. Herein the vocabulary of politics is especially rich, with such phrases as riding on the band wagon, frying fat, sawing wood, bolting one's ticket, coming out flat-footed, shaking the plum-tree, taking to the woods, and looking after one's fences, together with such terms as calamity howler, cracker-box politician, filibuster, the full dinner-pail, muck-raker, peanut politics, pie counter, pipe laying, pork-barrel legislation, presidential timber, pussysfooting, soft pedal, spellbinder, steering committee, straddle, and straw vote.

Outside politics the American gift for vivid metaphor is illustrated by such inventions as bouncer, corduroy road, dough-face, gold brick, hard sledding, hayseed, jug-handled, rubberneck, silk-stocking district, spite fence, still hunt, sucker, tabloid (paper), tenderfoot, and tightwad.

Americans frequently acquire what is practically a new word without the trouble of a fresh coinage by simply turning a noun into a verb (to contact, to page, to railroad, to recess), or a verb into a noun (divide, raise), or an adjective into a noun (alternate, sharp, spiritual, tough, transient), or a noun into an adjective (banner, dandy), or an adverb into a noun (sooner), or an intransitive verb into a transitive (to appeal,

to protest, to rank), or a transitive into an intransitive (to locate, to substitute). Such interchanges of parts of speech presumably occur in the history of every language, but in America they seem to come about with special frequency, and with little consideration of whether they are really necessary.

A great deal might be said of American preferences in the case of words of identical meaning. The American choice between two synonyms commonly falls upon the more grandiloquent, especially if there is a touch of Greek or Latin about it. Thus we find alumnus, auditorium, automobile, bureau, campus, data, elevator, forum, intermission, janitor, mucilage, operate, proposition, radio, reservation, schedule, semi-annual, sophomore, stenographer, traction, and vacation, where a simpler term would be used in England. So, too, there is a marked tendency towards a sort of euphemism—the magnifying of an office by applying to it a designation which really belongs to a position of higher status, e.g. clerk (shop assistant), help (servant), judge (magistrate), jurist (lawyer). The title of president may be given to the head of any kind of business organization—a bank, a railway, even a costermongers' trade union—and that of professor to a master in a secondary school.

Examples of other American preferences are administration (government), canned (tinned) goods, faucet (tap), hog (pig), mail (post), package (parcel), and pasteboard (cardboard). The words figure, file, fix, get, grade, and line suffer more from overwork in the U.S. than in Great Britain.

Prepositions

The choice of the preposition to use in various connexions often varies from that commonly made in Great Britain. Thus we hear or read of imprisonment at hard labour, five minutes of (or after) three, a new lease on life, the man on the street, playing on the eleven, and the laugh was on me. A common American tendency is to strengthen a verb by appending an adverb which, one might have supposed, it could quite well do without, e.g. start in, close down, check up.

Americans break away from the normal English usage much less in their writing than in their speaking. An American scientific study, or historical text-book, or volume of literary criticism, or theological treatise is likely to

contain few expressions unfamiliar to an English reader. This generalisation, of course, does not apply to the American drama; nor to the American novel, comprising as it does a large proportion of dialogue.

The invasion of England by Americanisms alarms Englishmen who are concerned about the purity of the language. There are some who are afraid that before long the King's English will be superseded by the President's English. Their fears, however natural, are not based upon any real cause for anxiety. The process of naturalisation has been going on from the very first, and in the main the language has been enriched by it. It would surprise most Englishmen to learn how many Americanisms, which originally had a hostile reception here, are now a part of their own speech. As late as the middle of the 19th century the use of progress as a verb was deprecated as un-English. Even the most extreme linguistic protectionist does not hesitate today to employ such American neologisms as boarding house, graveyard, outdoors, overcoat, patent leather, and telegram. The American film has exerted a considerable influence, but mainly in the substitution, through its greater picturesqueness and vivacity, of American for English slang. It may be doubted whether, apart from slang, either the Hollywood film or the billeting of U.S. troops in Great Britain has affected the Englishman's speech as much as some suppose. While he no longer needs an interpreter to explain to him what is meant by an elevator or a valise, he has not incorporated these terms in his own everyday vocabulary.

Herbert W. Horwill

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American Laurel (*Kalmia latifolia*). Evergreen shrub of the family Ericaceae, a native of N. America. The leathery leaves are oblong or lance-shaped, and the large pink or white flowers are massed in showy clusters. In the newly opened flower the ten sta-

mens are held in little pouches but when a nectar-seeking bee touches their filament they spring out and dust it with pollen. Alternative names are mountain laurel, calico bush, and spoonwood.



American, or Mountain, Laurel

American Legion. Organization of Americans who served as soldiers, sailors, or airmen in the First and Second Great Wars. It was organized in Paris in March,



American Legion. Official button

1919, at a meeting of representatives from all the divisions in France. It was afterwards established in the U.S.A., posts being set up in each state, with headquarters at Indianapolis. In 1945 membership was 1,417,446.

American Loan. For details of this financial arrangement of 1945-48, see N.V.

American Museum of Natural History. Museum in New York. It adjoins Central Park at West 79th Street. It is not only strong in collections illustrating the fauna of the continent, but contains the Tiffany collection of gems and a unique exhibit of Peruvian antiquities. The Rothschild collection, acquired in 1932, helps to make the study collection of birds the largest in the world, comprising 750,000 specimens.



American Museum of Natural History, New York, housing collections of immense value and interest

Many specimens of birds, etc., are arranged to show their environment and habits.

American Notes for General Circulation. The title of a work published in Oct., 1842, containing Charles Dickens's impressions of his visit to the U.S.A. and Canada in the first six months of that year. Boston, Lowell, New York, Philadelphia, Washington, Baltimore, Cincinnati, St. Louis, Lebanon, Toronto, Montreal, and Quebec were described, as were the Ohio, the Potomac, the Mississippi, Niagara, and the prairie. Dickens's strong criticisms of American institutions were hotly resented, but after his second visit in 1865 he arranged that a preface should be added to all subsequent editions stating that his criticisms had no longer any justification.

American Organ. Musical instrument of the harmonium type. The wind is drawn through the reeds, not blown through, as in the harmonium, which the American organ has largely superseded in the U.K.

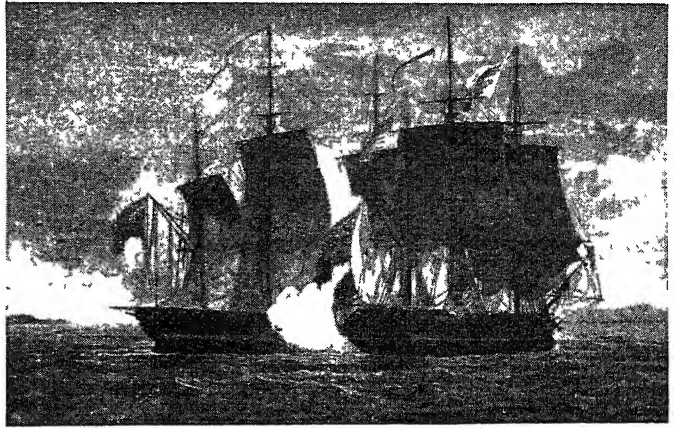
American Volunteer Group. Group of U.S. airmen in the Second Great War, who resigned U.S. commissions to join the China Air Force and protect the U.S. lease-lend convoys passing along the Burma Road. They achieved a remarkable record against the Japanese in Burma, notably at Rangoon early in 1942. Formed early in 1941, under Col. (later Gen.) Chennault, the group was absorbed in July, 1942, into the U.S. Army Air Force in China, where the men were nicknamed the Flying Tigers.

American War of 1812-14. This war between Great Britain and the U.S.A. had its origin in Britain's great struggle against the French. The U.S.A. had prospered during the war by trading with the enemy, and resented British interference with its shipping, for many American ships were captured by British frigates and brought into British ports. There was exasperation on both sides, and the American retaliatory policy increased the tension. Again, the prosperous shipping trade of the U.S.A. had induced numbers of Englishmen to desert and take service in American ships, where they were eagerly welcomed. The British navy being at the time undermanned, British officers seized in return men out of American ships and impressed them for the British navy. It was said that no American seaman was safe from seizure, either on the high seas or

on the American coast. Public feeling became inflamed by what was described as fraud on one side and outrage on the other.

War was declared on Jan. 18, 1812, and soon the Americans moved on Canada at both ends of Lake Erie. Across the Detroit that country was invaded in July by a small army under General William Hull, but his men were driven back to Detroit and captured with the town by the British under Sir Isaac Brock, with whom was a force of Indians. The invasion of Canada made by the other route, the Niagara one, was also a failure. There was an engagement at Queenstown Heights in Oct., in which Brock was killed, but the victory remained with his men, who captured 900 American soldiers. A third attempt also failed.

The war was also waged on the water, and some of its incidents soon gave a rude shock to the British navy, then at its zenith. The Americans had no ships of the line, but in the United States, Constitution, and President they had three splendid 44-gun frigates, superior to anything of the kind that Britain possessed. These ships were in a state of high efficiency, to which they had been brought partly by deserters from the British navy, while some of the American seamen had seen service in the Tripoli war. Captain Philip Broke went out with a squadron to cruise against the United States, his broad pennant being in the Shannon. None of his frigates carried more than 38 guns. Captain Isaac Hull, in the Constitution, eluded him, but on Aug. 19 encountered the British 38-gun frigate Guerrière, and by sheer weight of fire reduced her to such a condition that she had to be



American War of 1812-14. Famous battle of Boston Harbour, June 1, 1813, in which H.M.S. Shannon engaged and defeated the American Chesapeake

Painting by T. Whitcombe

destroyed. A few weeks later, on Oct. 25, off the Canaries, the frigate United States, commanded by Captain Stephen Decatur, captured, after a spirited action, the British frigate Macedonian, to which in every respect except speed she was superior. On Dec. 29 the British 38-gun frigate Java was captured by the U.S. frigate Constitution, in an action which combined skilful manoeuvre with good gunnery.

The most celebrated action of the whole war was the duel on June 1, 1813, between the Shannon of 38 guns, Captain Broke, and the Chesapeake, Captain Lawrence, which carried 36 guns, but had two more carronades than the Shannon. Approximately the ships were of equal strength; both were highly efficient, and were commanded by equally gallant men. Broke had written a courteous challenge to Lawrence to

come out for a single-ship action "whenever it is most convenient to you." It was a fight yard-arm to yard-arm, and the victory of the British ship was complete. Lawrence was killed, with many of his officers, and his ship was captured by boarding. The American coasts were afterwards blockaded and the U.S. frigates were held fast, but there were many sloop actions and British commerce was attacked. There was a good deal of fighting, too, on the Great Lakes. The naval battle on Lake Erie on Sept. 10, 1813, in which the Americans were successful, caused the British to lose Detroit and Michigan.

In 1813 on land the British invaded the States, and won an engagement at Frenchtown, but in August their attempt on Fort Sandusky was repulsed. They abandoned the line of the Niagara and lost Fort George in May, while in Oct. they were beaten in a battle near the river Thames and the Americans got part of Ontario. The Americans sent a force, which landed at York, afterwards Toronto, in April and burned some of its buildings, but their efforts to reach Montreal were balked, their army being beaten at Williamsburg in Oct., while their gains near Niagara were soon lost.

In 1814 the Americans again tried the Niagara route into Canada and won a battle at Chippewa on July 5. The engagement at Lundy's Lane on July 25, the most serious of the war, was indecisive, both sides claiming the victory, but the attempted invasion was abandoned. In Dec. the Americans lost the fight called after Chrystler's Farm. The last attempts of the British, who were



American War of 1812-14. Death of Capt. Lawrence, of the Chesapeake, on the boarding of his ship, June 1, 1813, by sailors of H.M.S. Shannon

From an old engraving

now able to send over veterans of the Peninsular War, were more ambitious. General Ross, with an army and a fleet, sailed into Chesapeake Bay, brushed the Americans from his path at Bladensburg on Aug. 24, and, in return for the damage done at York, burned the public buildings of Washington. He then advanced towards Baltimore, but was killed in an engagement, and, when within a few miles of the city, his men withdrew.

Another combined operation of army and navy, also in 1814, was the attack on Plattsburg on Lake Champlain. This was captured and there was some desperate fighting on the lake. Victory, however, remained eventually with the Americans, and the troops under Sir George Prevost, who were advancing up the W. side of Lake Champlain, retired into Canada.

The last engagement of the war was the attack on New Orleans under General Pakenham, in which that officer lost his life. The greatest gallantry was displayed on both sides, but the expedition was utterly mismanaged owing to the divided counsels of the British commanders. The assault was delivered at a number of different points on Jan. 8, 1815, and failed owing to want of cooperation. The slaughter was so terrible that General Lambert, who had succeeded to the command, decided to withdraw. It could not be known at the time that the convention of Ghent had been signed on Dec. 24, 1814, ending a war of which the Canadians alone could be proud.

Americium. This element, named in 1946, is mentioned in the footnote to the table of Chemical Elements, p. 1987.

Amerighi, MICHELANGELO (1589-1609). Italian painter, known, from his birthplace, as Caravaggio (*q.v.*).

Amerind. Term denoting the aboriginal American race. It was introduced in 1898, at the suggestion of Dr. C. P. J. Scott, by Major J. W. Powell, director of the Bureau of American Ethnology, as a compendious synonym for American Indian (*q.v.*) or Redskin.

Amerongen. Village of Holland, in Utrecht province. It is 20 m. S.E. of Utrecht and contains the castle of Amerongen, the seat of Count Bentinck, to which the German emperor, William II, fled on the conclusion of the First Great War.

Amersfoort. Town of Holland, Utrecht province. It is on the Eem, 14 m. by rly. N.E. of Utrecht,

manufactures cottons and woollens, silk, glass, and beer, and trades in grain and tobacco. Pop. 48,079.

Amersham. Market town of Buckinghamshire, England. Increasingly popular as a residential area, it is 24 m. W.N.W. of London by rly. and London Transport, and has chairmaking, flour-milling, straw-plait, brewing, and other industries. Here is a government centre for atomic and radio-activity research. In S. Mary's church, a fine old building with brasses and other monuments, John Knox is said to have preached against Queen Mary. In the main street are the market house, built in 1682, and some almshouses of earlier date. The old name, mentioned in Domesday, was Agmondesham. Pop. 6,121.

Amery, LEOPOLD CHARLES MAURICE STENNETT (b. 1873). British politician. Born at Gorakhpur, India, Nov. 22, 1873, and educated at Harrow and Balliol College, Oxford, he became a fellow of All Souls and a barrister. Joining the editorial staff of *The Times* in 1899, he acted as its chief war correspondent in the South African war. Elected M.P. for S. Birmingham (later Sparkbrook) in 1911, and retaining the seat until 1945, he became assistant secretary to the War Cabinet in 1917, First Lord of the Admiralty 1922, secretary of state for the Colonies 1924-29, secretary of state for India and for Burma 1940-45. After his electoral defeat in July, 1945, he was made Companion of Honour.

For the activities and trial of John Amery (1912-45) see Treason.

Ames, LESLIE (b. 1905). English professional cricketer. Born at Elham, Kent, Dec. 5, 1905, he joined the staff of the Kent county cricket club in 1924 and became a regular member of the county XI in 1926. Although a fine forcing batsman, scoring over 2,000 runs in 1932, and over 3,000 in 1933, it was as wicket-keeper that he first played for England against Australia in 1930 (having toured Australia in 1928-29 without playing in test matches). From 1932 to 1939 he was England's first choice as a wicket-keeper. In 1939 he won the Lawrence trophy for the fastest

century in a county match with 100 runs in 67 minutes at Kennington Oval.

Amesbury. Market town of Wiltshire, England, on the Avon near the S.E. edge of Salisbury Plain. A former Benedictine abbey is traditionally known as the retreat of Guinevere, wife of King Arthur. Here in 1727, as the guest of the Queensberry family, John Gay (*q.v.*) wrote *The Beggar's Opera*. There is a large Norman and Early English church. Earthworks known as Vespasian's Camp are probably prehistoric, and 2 m. W. lies Stonehenge (*q.v.*). Pop. 2,488.

Amethyst. Name of a lilac to purple coloured quartz used as a gem-stone. The colour is due to a small amount of manganese present as an impurity. It is in all cases deposited from solution and occurs in mineral veins, more especially those of iron and manganese, and lining cavities in pebbles. Amethysts are of low specific gravity (only about 2.66) and moderately hard. They are of a twin molecular structure, the individuals having alternately right-handed and left-handed helical twists, which give the stones their peculiar rippled fracture; and they are often built up of dark and light layers. The richest stones come from Brazil and Uruguay. The amethyst was supposed by the ancients to be a remedy against drunkenness (Gr. *amethystos*)—hence the name. Oriental amethyst is a natural corundum of gem quality.

Amethyst. British frigate which on July 30, 1949, having been cut off for three months in the upper reaches of the Yang-tse, escaped to the open sea under Chinese Communist gun-fire. See N.V.

Amhara. Northern portion of Abyssinia. It includes Gojjam and was at one time a powerful state. The capital, Gondar, was the residence of the Abyssinian emperors until the middle of the 19th century.

Amhara was one of the centres of fighting in the Italo-Abyssinian war (1935-1936) and was finally subjugated by the Italians. In 1941 it became a vast battlefield in the fighting between Imperial forces and Italian troops. With the capture of Gondar by E. African troops, Nov. 27, 1941, the liberation of Abyssinia was completed. See Abyssinia; Gondar.

Amharic. A Semitic language spoken throughout Abyssinia. Originally a provincial dialect, Amharic gradually displaced Ge'ez or



L. C. M. S. Amery.
British politician

Ethiopic, the ancient language, and is now the court and official language Geez being used only by scholars and in the church. Amharic is written in Geez characters. Near Ashmunin, in upper Egypt, 8 rolls of papyrus with Amharic writing, the first to be found on papyri, were unearthed in 1945.

Amherst. Coast town of Nova Scotia, Canada. The capital of Cumberland county, it is situated at the N.E. extremity of Chignecto Bay, 135 m. N.N.W. of Halifax by the C.N. Rly. It is the centre of a rich farming area, and trades largely in rolling stock, lumber, and coal, and has shipbuilding yards, boot, shoe, leather, and woollen factories, and iron foundries. Pop. 8,620.

Amherst. Coast town and district of Tenasserim, Lower Burma. The town is 30 m. S.W. of Moulmein, and dates from 1826. It is now little more than a fishing village and a bathing resort for the inhabitants of Moulmein. The district, 7,062 sq. m. in area, is bounded E. by Siam and W. by the Gulf of Martaban. Salt is produced in the district.

During the Second Great War, Amherst was occupied by the Japanese for three years, after the latter had launched a powerful offensive against Tenasserim during the last week of Jan., 1942. With the liberation of Rangoon by the British 14th army in May, 1945, Japanese troops withdrew from the area.

Amherst. Town of Massachusetts, U.S.A., in Hampshire county. It is 97 m. W. of Boston, on the Central Vermont and the Boston and Maine rlys. The town dates from about 1700, but received its present name about 1759, in honour of Jeffrey Amherst. It is the seat of Amherst College, founded by the Congregationalists in 1821. Pop. 6,410.

Amherst, EARL. British title created in 1826. Sir Jeffrey Amherst (1717-97) was made a baron in 1776, and his nephew, William Pitt Amherst (1773-1857), governor-general of India, was the first earl. The earl's eldest son is known as Viscount Holmesdale. The barony of Amherst of Hackney must be distinguished from the earldom. It was bestowed in 1892 upon a Norfolk M.P., W. A. Tyssen-Amherst. The 3rd baron succeeded his grandmother in 1919.

Amherst, JEFFREY AMHERST, BARON (1717-97). British soldier. Born of a Kentish family, Jan. 29, 1717, he entered the Guards as an



Baron Amherst, British soldier and colonial governor
After Sir Joshua Reynolds

ensign in 1731. In 1758 Pitt made him commander of an expedition against the French in Canada. He captured Louisburg and led one of the three columns which, converging on Montreal, entered that city in Sept., 1760. Amherst was then chosen governor-general of the British possessions in N. America and in 1761 was knighted. In 1763 he returned to England, in 1770 was made governor of Guernsey, in 1772 a privy councillor, and in 1776 was raised to the peerage as Baron Amherst of Montreal. After acting for several years as commander-in-chief he was made a field-marshal in 1796. He died Aug. 3, 1797.

Amherst, WILLIAM PITT AMHERST, EARL (1773-1857). British diplomatist. Born in Jan., 1773, he owed his Christian names to the friendship of his uncle Jeffrey, Lord Amherst, with Pitt. Succeeding under



Earl Amherst, British diplomat
Portrait Sir T. Lawrence

a special remainder to the barony of Amherst in 1797, he went in 1816 as British envoy to Peking, to obtain more satisfactory treatment for British merchants in China. The mission was fruitless, Amherst refusing to perform the kow-tow, or act of homage, to the emperor. From 1823-8 he was governor-general of India, and on the successful issue of the first Burmese war, 1826, he was created Earl Amherst of Arakan. He died in March, 1857. *Consult* Lord Amherst and the Advance to Burma, A. T. Ritchie and R. Evans, 1894.

Amherstburg. Town of Ontario, Canada. On the Detroit river and the Michigan Central Rly., which here crosses the river, it is 18 m. S. of Windsor, in Essex county, and is a calling place for boats engaged in the traffic of the Great Lakes. It has cement and iron manufactures, and carries on a large trade in timber. Pop. 2,769.

Amianth OR **AMIANT** (Greek *amiantos*, undefiled). Name given to the finest variety of the mineral asbestos. It consists of long flexible filaments, and from its resemblance to flax is sometimes called mountain or earth flax. It is incombustible and is used for lamp wicks and as a filling for gas fires. The name is also applied to a fine fibrous serpentine. The form amianth is due to confusion with the Greek word *anthos*, flower.

Amice (Lat. *amicire*, to throw round). Oblong piece of linen worn by the celebrant at Mass and by assistant ministers when the alb is worn. Rested for a moment on the head, it is then spread on the shoulders and tied with strings. It is said to symbolise the helmet of salvation or faith, or the linen rag with which the Jews blindfolded Christ (Luke 22). The hood or cloak with long ends made of or lined with grey fur, worn by monks and pilgrims, was also called an amice. *Pron.* Am'-iss.

Amicus Curiae. Latin term meaning a friend of the court, used in English, as it was in Roman law. When a barrister who is not retained in a cause intervenes, either of his own motion or at the judge's request, to assist the court, e.g. by reminding the judge of some precedent that neither party has yet cited, he is known as *amicus curiae*.

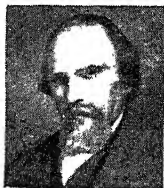
Amides. Bodies derived from ammonia (NH_3) by replacing one of the hydrogen (H) atoms by a metal or organic radical. When two atoms of the hydrogen are replaced the product is an imide, or secondary amide, and if the whole of the hydrogen is displaced by a trivalent radical a nitrile or tertiary amide results. Amides are thus compound ammonias. They are made by the action of ammonia on acid chlorides or on ethers, or by heating ammonium salts. Amides are crystalline solids, the lower amides being soluble in water and alcohol. They are decomposed by bacteria, as, for instance, urea, which is broken down into carbon dioxide and ammonia. Amide powder is a name applied to an explosive made from ammonium nitrate, salt-petre, and charcoal.

Amidines. Organic compounds that contain amidogen (NH_2) and imidogen (NH) attached to the same carbon atom. Acetamidine, for example, may have its formula written $\text{C}_2\text{H}_5\text{N}_2$ or, to express the constitution referred to above, $\text{CH}_3\cdot\text{C}(\text{NH})\cdot\text{NH}_2$.

Amidol OR DIAMINO-PHENOL HYDROCHLORIDE. Photographic developer discovered by Gauche in 1869. It is used by dissolving $1\frac{1}{2}$ gr. in a solution of 48 gr. of sodium sulphite in 1 oz. of water.

Amidopyrine. Powerful analgesic drug of the coal-tar group, symbol $\text{C}_{13}\text{H}_{17}\text{ON}_3$. White, crystalline, odourless powder, made by the reduction of nitrosophenazone and subsequent treatment with methyl iodide. Prolonged administration may cause the blood disease known as agranulocytosis.

Amiel, HENRI FRÉDÉRIC (1821-81). Swiss author. Born at Geneva, Sept. 27, 1821, he was an orphan at the age of twelve. He spent a wandering student life in Germany, Italy, and elsewhere in Europe, contributed to the *Bibliothèque Universelle de*



Henri F. Amiel,
Swiss author

Genève, became professor first of aesthetics and French literature and then of moral philosophy at Geneva, and wrote verse, but is best remembered for his posthumous *Journal Intime* of 17,000 MS. pages, 1848-81. Parts of the *Journal* were published in 1883-4, with an introduction by Amiel's friend Edmond Scherer. An English translation by Mrs. Humphry Ward appeared in 1885.

The *Journal*, which has been compared, not very happily, with Sénancour's *Obermann* and Rousseau's *Confessions*, is saturated with the spirit of a devout melancholy, influenced profoundly by Buddhist philosophy and current German pessimism. While an example of the paralysis caused by excessive introspection, it reveals, as Matthew Arnold pointed out in a memorable essay, fine gifts of mind in its literary and social criticism. Amiel died at Geneva, May 11, 1881. *Consult* *Essays in Criticism*, Matthew Arnold, repr. 1903.

Amiens. A city of France. It stands on the Somme, mainly on the left bank, 81 m. N. of Paris, and is the capital of the department of Somme. The river divides into a number of branches, and

these, with its tributaries the Avre and the Selle, form canals in the lower part of the town. It has hence been called the Little Venice. The oldest part of the city is on the right bank; the business quarters are on the left bank and around them are modern suburbs. The old town has narrow irregular streets. Boulevards occupy the site of the old fortifications.

The finest building in Amiens is the Gothic cathedral. It was built mainly in the 13th century and is remarkable for its size, for the wonderful stonework of the W. façade, and for its choir stalls. It was restored by Viollet-le-Duc. Other important churches are S. Germain, S. Leu, S. Remi, and the modern S. Jacques.

The citadel dates from the 16th century and the prefecture from the 18th. The hôtel de ville has been almost entirely rebuilt. Modern buildings include the palais



de justice, the public library, colleges, and schools. There are many old houses and some fine squares. The Museum of Picardy has a valuable collection of paintings, antiquities, etc., including frescoes by Puvion de Chavannes. The Promenade de la Hotoie is a fine open space, while

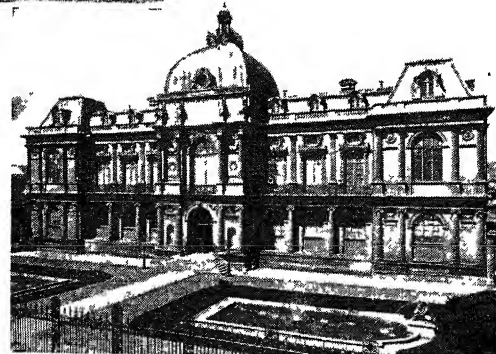
the belfry and the Hôtel Dieu may be mentioned. There is a special workmen's quarter.

Amiens is an important manufacturing and distributing centre. Its industries include the spinning and weaving of textiles—cotton, wool, flax, silk, etc.—and the making of velvet, hosiery, etc. Machinery, chemicals, and sugar are also produced. The industrial importance of Amiens dates from the 12th century, and it is the cradle of the French cotton manufactures. In the neighbourhood to the N.E. market-gardening is largely carried on, and the produce, with that of the local farms, is a considerable item of trade. Amiens is an important railway centre and has quays for the shipping on the river. Trolley-buses run through many of the streets.

Amiens in History

Amiens was a Gallic settlement and in the 4th century the seat of a bishop. Later it was part of Flanders until 1185, when it became French. From 1435 to 1477 it was included in Burgundy, but, recovered by France, it was until the Revolution the capital of Picardy. It surrendered to the Germans on Nov. 28, 1870. During the First Great War, after a German occupation that lasted only a few days before the battle of the Marne in Sept., 1914, it became chief centre of military communications in northern France. The German offensive of March, 1918, brought it within gunfire and for several weeks it was in danger. Shells caused some damage to the cathedral. The Allies were unable to use the main trunk line from Amiens to Paris until the battle of Amiens (*q.v.*) finally cleared the town in Aug., 1918.

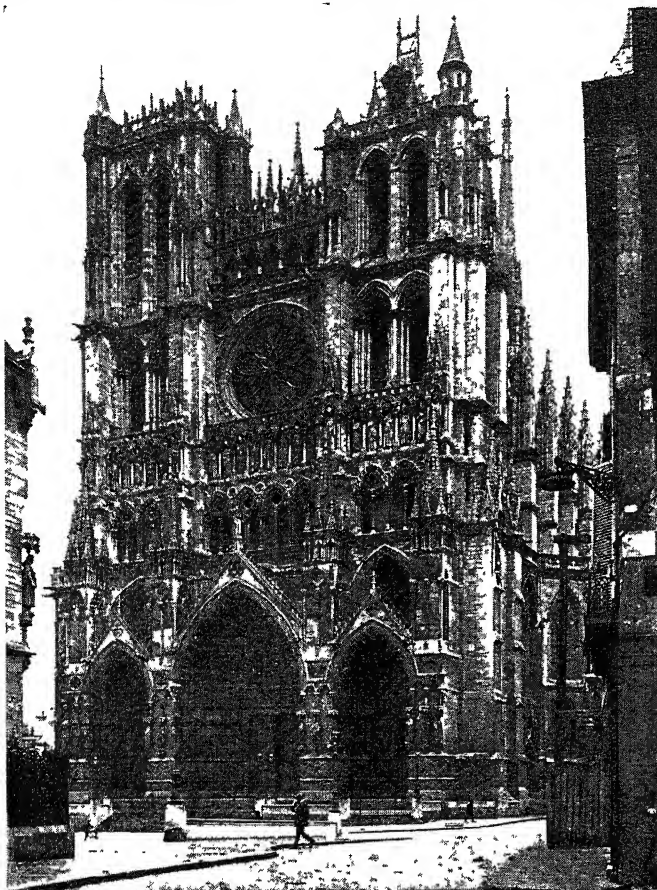
In the Second Great War, German troops reached Amiens on



Amiens. The Museum of Picardy, built 1854-64; and (above) 18th century portion of the hôtel de ville



Amiens arms



Amiens. West façade of the Cathedral, regarded as the finest example of Gothic ecclesiastical architecture in France. It was built in the 13th century

May 18, 1940, in their thrust to the Channel ports, and the town was fully occupied by May 21. Rly. yards and other important military targets were heavily bombed by R.A.F. and U.S.A.A.F. aircraft in Aug., 1942, and April, 1944. The town was liberated by the British 2nd army on Sept. 2, 1944. Pop. (pre-war) 93,773.

Amiens, BATTLE OF. Operation of the First Great War, fought Aug. 8-12, 1918. It marked the opening of the British counter-offensive, and came as a great shock to the German staff, which imagined that the British army had been permanently paralysed by the German spring offensives. The object of the British attack was to clear Amiens and the important railways there, and to penetrate to the junction of Chaulnes. For the operation the 1st French army (Débeney) was placed under Sir D. Haig, while the British 4th army (Rawlinson)

was reinforced by the Canadian corps and two additional British divisions. On the Allied front 13 infantry and 3 cavalry divisions were employed against 20 German divisions under von der Marwitz, with von Hutier's army to the S. of him. Special care was taken to mislead the Germans and make them suppose the attack was coming in Flanders. Canadian troops, greatly feared as a shock force, were put into the line near Kemmel. Tanks were concentrated at St. Pol and the German aircraft were allowed to photograph them. Troops and tanks were then moved secretly south. The tanks were to be used as in the first battle of Cambrai, where they took the enemy completely by surprise. Meanwhile the artillery (2,000 guns) were not permitted to test aim and range by firing in advance: by accurate calculation it had become possible to dispense with such registration.

As a result of all these measures, the Germans made ready for an attack S. of Ypres and were off their guard near Amiens. See map on p. 390.

The British attack was to open at 4.20 a.m. on Aug. 8, from Morlancourt to Domart, and was to be followed one hour later by the advance of the 1st French army, the latter gradually extending its front S. to Braches. Thick fog covered the ground when the artillery opened fire and simultaneously 400 tanks and the British infantry moved up behind a creeping barrage. Many German batteries were at once overwhelmed by the fast light "whippet" tanks. They were not well entrenched, intending attack rather than defence. The first objectives were rapidly seized; a whole German brigade, marching out of the trenches, surrendered. Cavalry, light tanks, and armoured cars, piloted by aircraft, with fresh infantry, passed through the British line and went forward to exploit the victory. At dusk the British had penetrated to a depth of 6 or 7 miles. Nothing could have exceeded the confusion behind the German lines. The French attacked von Hutier, stormed Morisel, enveloped Moreuil and Montdidier. At nightfall the Germans were blowing up dumps and moving east under a torrent of bombs and machine-gun bullets.

On Aug. 9, N. of the Somme, the British with one American regiment pushed E. of Morlancourt; S. of the river they reached the outskirts of Proyard and Lihons. A new French army, the 3rd (Humbert), entered the battle by attacking S.E. of Montdidier, suddenly and without any artillery preparation. The Germans began to withdraw from that town next morning, but a large part of their garrison was surrounded and surrendered. By the night of Aug. 11 the British and French S. of the Somme had reached at most points the old line of German defences as it existed before the battles of the Somme and Hindenburg's retreat of 1917 and had gained the rly. S. of Chaulnes. There the Germans were able to stand, as time was required for the advance of Allied heavy artillery.

The victory was by far the greatest that the Allies had won up to that date in the West. Over 38,500 prisoners and 800 guns were taken. Amiens was cleared; Paris was relieved of constant bombardment. The Germans' losses of material and

ammunition and the extent of their casualties obliged them to carry out retirements farther north. The prestige of the German staff was shattered; Ludendorff immediately advised his government to make peace. He subsequently referred to Aug. 8 as the "black day" in the history of the German army. The effect on the British army was most inspiring. Great success had been won by the skill and determination of the troops, of whom the Canadians and Australians received special praise from Haig. An advance was made to a total depth of 12 miles, such as had been equalled in no previous Allied offensive in the same time. This victory was the more remarkable for two further reasons: it followed the defeats which the British army had suffered in the great German offensive, and proved that army to be more than a match for the enemy in open warfare, a point on which there had been some doubt.

Amiens, MISE OF. Name given to the award of Louis IX of France in a dispute between the English king Henry III and his barons, Jan. 23, 1264. The two parties were at war, the future Edward I fighting for his father, who had refused to abide by the Provisions of Oxford. Neither side could gain any marked advantage, and they decided to refer the matter to the arbitration of the French king. He heard both sides, and then issued his *mise* or award. This freed Henry from the hated Provisions, restoring to him full power and free jurisdiction. It was confirmed by Pope Urban IV. The English barons, however, refused to accept the decision and therefore the civil war was renewed. See *Barons' War*.

Amiens, TREATY OF. Signed between Great Britain and France on March 25-27, 1802. Spain and Holland were parties, but merely as the vassals of Napoleon. Nego-

tiations began in March, 1801. Napoleon agreed to some concessions, and a preliminary treaty was signed on Oct. 1. The final treaty provided that Malta should be returned to the Knights of S. John, Britain should restore all her conquests except Ceylon and Trinidad, and France should compensate the prince of Orange for the loss of his possessions. Egypt

replacing the hydrogen atoms of ammonia (NH_3) by one or more alcohol radicals, such as methyl, ethyl, and propyl. They are divided into primary, secondary, or tertiary, according as one, two, or three of the hydrogen atoms have been replaced. A fourth type, called the quaternary compounds, is known. The classes of amines differ in chemical properties. The amines are found as decomposition products of animal and vegetable matter. To the methyl amines, for example, is due the odour of decomposing fish. Increasing use is being found for the amines in the manufacture of pharmaceutical products, dyes, and detergents.

Amirantes Islands (Portuguese *Ilhas do Almirante*, Admiral's Islands). British archipelago in the Indian Ocean, S.W. of the Seychelles, consisting of the following groups: African Is. (4), St. Joseph (8), Porvre (9), and Alphonso (3). Of coral formation and fertile, they produce coconut oil and are visited for turtle fishing. British since 1814, they are a dependency of the Seychelles. They were named after Vasco da Gama, who received the title of admiral of India in 1502.

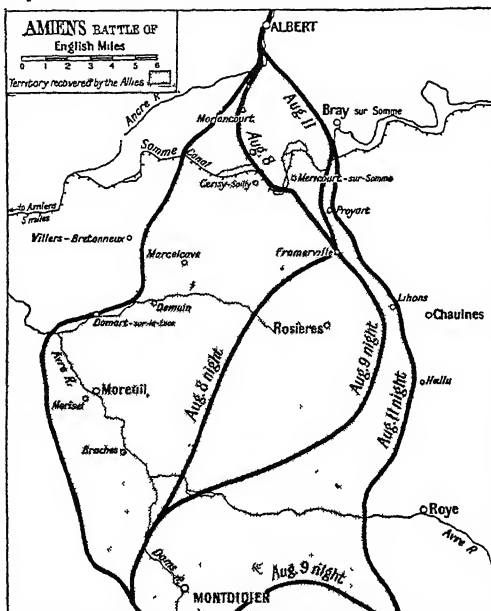
Amity. Village in Colorado, U.S.A. It is on the Arkansas river and was created a colony in 1898 by the industrial division of the Salvation Army. The broad alluvial flats are well suited for the production, on irrigated land, of sugar beets. It is 495 m. W. of Kansas City on the Santa Fé route to Los Angeles.

Amlwch. Urban district, seaside resort, and seaport of Anglesey, Wales. The port is dry at low water. It is on the N. coast, 24 m. N.W. of Bangor by the railway. Once famous for copper mines, shipbuilding, and iron and brass founding, it has an old church and some antiquarian relics. Pop. 2,500.

Amman. Capital of Transjordan. The Rabbath-Ammon of the Bible, and the Philadelphia of the Greeks, it lies on the E. side of the Jordan, 30 m. in a direct line E. of Jericho.

In the First Great War Amman formed an important Turkish base on the Hejaz rly., but was finally captured by Allenby's troops on Sept. 25, 1918.

Ammanford. Urban district of Carmarthenshire, Wales, 12 m. N. of Swansea, well served by rlys. The industries include coal mining, tin working, and the manufacture of springs. Pop. 7,160.

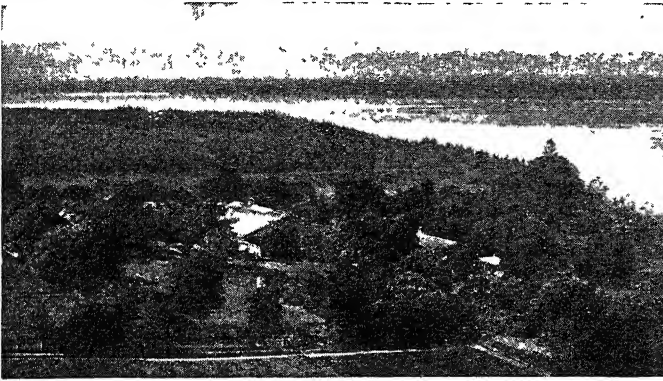


Amiens battlefield, showing the extent of territory recovered from the Germans in four days of fighting

was to be restored to Turkey and the Cape of Good Hope to the Dutch, while France was to withdraw from Rome and Naples. The chief representative of Britain was the Marquess Cornwallis and of France Joseph Bonaparte. It was merely a truce in the long struggle, for the war broke out again in May, 1803.

Amindivi OR **AMINI.** The northern group of the Laccadive coral islands, which are administratively a part of the province of Madras, India. They are five in number—Chetlat, Kiltan, Kardamat, Amini, and Bitra, of which only the first three are inhabited, and are ruled locally by native headmen. The people are Mahomedans, and they speak Malayalam. They depend for their existence upon coconut palms, with which the islands are densely planted; nuts, and, in a smaller degree, coir and mats are traded for rice with the mainland.

Amines OR **AMMONIA BASES.** Chemical substances formed by



Ammer See. One of the river-formed lakes of the Bavarian Alps, the waters of which flow to the Danube

Ammer See. Lake of Bavaria, 20 m. S.W. of Munich. Formed by the river Ammer, which traverses it from S. to N., it is 10 m. long by 4 m., and 1,750 ft. above sea level. It is one of the monotonous river-formed lakes which characterise the plateau between the Alps and the Jura, and which drain into the upper Danube.

Ammeter OR AMPERE-METER. Form of galvanometer for measuring currents of electricity directly in units of amperes. A common type consists of a coil of low resistance connected in series with the circuit, so that the whole of the current to be measured flows through the wire forming the coil. The passage of the current through the coil endows it with magnetic properties, and causes it to affect a small permanent magnet mounted on pivots within the magnetic field. The intensity of the coil magnetism, and therefore of its action upon the permanent magnet, varies with the strength of the current; hence an opposing force, which may be furnished by a light coiled hair spring or by gravity, tending to restore the permanent magnet to its zero position, is necessary. A light pointer is attached to the magnet to indicate the current strength in amperes on a graduated scale.

Ammeters with fixed permanent magnets and a moving coil are of greater precision. As a coil able to carry the whole of the current would be too large, only a definite proportion, termed a shunt, is passed through the instrument. Another form of ammeter is provided with a soft iron, instead of a permanently magnetised, moving portion. Placed near it is a fixed piece of soft iron, and under the influence of the coil both pieces of iron become magnetised with

the same polarity, and the moving piece is consequently repelled by the fixed piece. An ammeter of this type may be used for the purpose of measuring alternating currents.

For high frequency and radio-frequency currents the hot-wire or thermal type is employed. The current passing through a thin wire or strip causes it to expand, the movement being transferred and multiplied through a straining wire to the pointer on the instrument dial. Another very accurate form of ammeter employs the principle of the thermo-couple (see Thermo-electricity).

For laboratory purposes instruments of the dynamometer type are used. A simple kind of dynamometer consists of two coils at right angles to each other, one fixed and the other suspended by a silk thread. The current to be measured passes through both coils, connexions to the swinging coil being made through little cups of mercury into which the ends of the coil dip. When a current is passed through the coils, the swinging coil tends to place itself parallel to the fixed coil. The deflection, which is opposed by a light spiral spring, is proportional to the square of the current. In recording ammeters the pointer is furnished with a pen fed with aniline dye. The pen traces a line on a drum revolved by clockwork, and the height of the line above a datum line indicates the current that has passed at any given time. See Galvanometer; Voltmeter.

Ammianus Marcellinus (c. A.D. 326-391). Author of a history of Rome from Nerva to Valens (96-378). Originally in thirty-one books, only the last eighteen, dealing with the period 352-78, are extant. A Greek of Antioch, his Latin is

harsh and obscure, but the work gives a valuable account of the history of his own times, especially the reign of Julian the Apostate, whom he accompanied to Persia (363), in addition to interesting descriptions of the manners, customs, and topography of different countries with which he was acquainted. There is an English translation by C. D. Yonge, 1894.

Ammon, AMEN, OR AMEN-RA. God of the ancient Egyptians. Originally a local god of S. Egypt, whose shrine at Thebes was founded or rebuilt about 2500 B.C., when the kings of Thebes became masters of the North, his importance grew until he came to be regarded as the supreme god. To maintain his position the priests identified him with Ra, the oldest of the Egyptian gods, and in time he assumed the attributes of the other great gods.

The name signified hidden, and Amen-Ra was described as representing the hidden and mysterious power which created and sustained the universe, with the sun as symbol of that power.

Ammon, CHARLES GEORGE AMMON, 1ST BARON (b. 1875). British politician. Educated at public elementary schools, and for 24 years in the Post Office service, he was a member of the L.C.C. 1919-25 and again from 1934, being chairman 1941-42. He was Labour M.P. for North Camberwell, 1922-31 and again 1935-44, when he was raised to the peerage. In the Labour governments of 1923 and 1929-31 he was parliamentary secretary to the Admiralty. In 1938 he was a member of the West African commission, and in 1943 leader of a government mission to Newfoundland. In 1944 he was appointed chairman of the National Dock Labour Corporation, Ltd.



Ammon, god of the Egyptians
British Museum

Ammonal. Name given to an important class of high explosives which contain ammonium nitrate and powdered aluminium (hence the name). The use of aluminium in explosives appears first to have been suggested by Escales, a German chemist, in 1899, and patents covering the manufacture and use of explosives of this type were taken out by a Viennese manufacturer, Carl Roth, in 1900. Aluminium is employed on account of its high temperature of combustion, as, the explosion gases being highly heated, greater power is developed by the explosive.

The aluminium is usually prepared by disintegrating a jet of liquid metal with a blast of steam or air. The quantity of aluminium employed varies considerably, according to the purpose for which the explosive is to be used, being as small as 5 p.c. in safety explosives, where it is essential that the temperature of explosion be kept low, and as high as 22 p.c. in military explosives.

The Austrians in the First Great War used ammonal extensively for filling shells and other projectiles, the usual percentages being aluminium 22, trinitrotoluene 30, ammonium nitrate 47, and charcoal 1. In the British service ammonal was very largely used for filling bombs and hand grenades and for mines, the composition being similar to the above; but the trinitrotoluene did not exceed 10 p.c., and the aluminium from 3 p.c. to 15 p.c. of the mixture.

Military ammonal is a comparatively insensitive explosive, and its use in the field is limited by the fact that it is difficult to ensure complete detonation when filled at high densities. See Explosives.

Safety explosives containing aluminium have been prepared with both nitrate and chlorate bases.

Ammon-Carbonite. A safety explosive. It consists of ammonium nitrate (82 p.c.), sensitised with nitroglycerine (4 p.c.), potassium nitrate (10 p.c.), and flour (4 p.c.). It is permitted for use in coal mines under the Belgian regulations. Being rather sensitive to detonation by impact, it is unsuitable for military use.

Ammonia (Greek *ammoniakon*, rock-salt). A colourless gas with a pungent characteristic odour, best known in a state of solution, consisting of water saturated with the gas. Ammonia turns red litmus paper blue and neutralises acids. It is chemically a compound of three equivalents of

hydrogen and one of nitrogen (NH_3). The gas is poisonous when breathed owing to its strongly alkaline properties, which result in the destruction of the mucous membrane. Ammonia is used in the manufacture of fertilisers, as a reagent in organic chemistry, in medicine, in dyeing, and in refrigerating plants. It is also of major importance in the manufacture of various explosives.

Although ammonia in some forms, probably a crude sal ammoniac (ammonium chloride), was known to the ancients—Pliny and Dioscorides (*q.v.*) both mention it in their works—it was not until 1774 that the existence of free ammonia was clearly recognized. In that year Priestley obtained the gas in a pure state by distilling sal ammoniac with quicklime and collecting the gas over mercury. Recognizing its alkaline property, Priestley called the gas "alkaline air" but it was also known as volatile air and spirit of hartshorn, having been formerly prepared by distilling hoofs and horns. Its composition was finally established in 1805 by Berthollet, who decomposed it by means of the electric spark.

Production of Ammonia

Although ammonia, especially as carbonate, is found almost everywhere in soil, water, and air as a product of the decomposition of organic bodies, none of these natural sources is of any technical importance. Ammonia is produced by two main processes: (1) by direct synthesis from hydrogen and atmospheric nitrogen, (2) from the destructive distillation of coal or lignite. The former process, which has predominated during recent years as a means of producing ammonia, consists in direct combination of the two gases. It was first thought to be impossible to cause hydrogen and nitrogen to combine directly to form ammonia, but in 1913 the first of the Haber-Bosch synthetic ammonia plants became an accomplished fact. The elements may be made to combine by passing the mixed gases, under pressures of 200 or more atmospheres, over a catalyst (see Catalysis). Considerable experimentation has been carried out to find the most effective catalysts and a wide range of materials is covered by patents. Most synthetic ammonia plants now in operation employ some form of iron compound for this purpose. Practically all the hydrogen used in ammonia synthesis is derived from water-gas,

coke-oven gas, or the electrolysis of water, while nitrogen is almost all obtained from the air. The gases used in this process require to be of great purity, as the presence of even minute quantities of carbon monoxide renders the catalyst inactive. During the Second Great War a large amount of synthetic ammonia was produced in connexion with the manufacture of explosives. In Canada, for example, where supplementary production was maintained remote from the danger of attack, the regular output of anhydrous ammonia greatly increased. Some Canadian ammonium nitrate was subsequently adapted to meet the peace-time need for fertiliser.

Sources and Compounds

The principal source of ammonia was formerly coal, for it is one of the by-products obtained in the manufacture of town gas. Town gas is purified in its making by subjection to cooling and washing processes, the gas-liquor obtained consisting of tar and ammonia. This gas-liquor is either saturated with sulphuric acid to form sulphate of ammonia, or it is subjected to distillation in stills, which work on a similar plan to the Coffey still used in preparing and refining alcohol. A form much used is the Feldman still.

By the interaction of ammonia gas and hydrochloric acid, ammonium chloride (NH_4Cl), or sal ammoniac, is formed; other salts, such as the nitrate and oxalate, can be made by a similar reaction. Ammonia combines with oils to form a white compound (chemically, a soap); where olive oil is employed, the product is known as hartshorn and oil. Solution of ammonia, *i.e.* the gas dissolved in water, is obtainable commercially in two strengths. The stronger, containing 36.6 p.c. by weight of ammonia, is known as "880," that being approximately the sp. gr. of the liquid. The weaker solution contains 10 p.c. of ammonia, and is sometimes referred to as spirit of hartshorn.

Bibliography. Coal-tar and Ammonia, G. Lunge, Part III, 5th ed., 1916; Design and Working of Ammonia Stills, Parrish, 1924; Fixed Nitrogen, American Chemical Society, 1932.

Ammoniaccum. Gum-resin obtained from *Dorema ammoniacum*, a herb growing in Persia and S. Siberia. It contains some volatile oil, which renders it of use in medicine for stimulating the flow of saliva and gastric juice, but

is now seldom administered. It was formerly used in chronic bronchitis to stimulate the bronchial mucous membrane and increase expectoration.

Ammonite. Extinct marine mollusc allied to the living nautilus and belonging to the class Cephalopoda. The name comprises several distinct genera which are found in a fossil state. The shell is coiled into a plane spiral and is variously ornamented by ribs, nodules, or spines. The successive coils, or whorls, may overlap each other by varying amounts or be merely in contact.

These fossils are found abundantly in the Mesozoic rocks and, on account of their short individual life and free-swimming powers, occur over wide areas in marine sediments of no great thickness. They are of the greatest value in aiding the correlation of geological formations, certain generic types and species everywhere succeeding each other in a definite order. They first appear in the marine

89 p.c., dinitronaphthalene 11-13 p.c., and up to 1 p.c. of moisture, but was later rendered safer by the addition of salt. A permitted explosive, ammonite 2 contains 4.5 to 6.5 p.c. dinitronaphthalene, 77.5 to 80.5 p.c. ammonium nitrate, 14 to 16 p.c. sodium chloride, and up to 2 p.c. moisture. It is prepared by grinding the dry ingredients together in an edge runner mill, the pan of which is heated to aid drying and secure closer incorporation.

The operation usually lasts about two and a half hours, when the pulverised mass is formed into cartridges, which are dipped in paraffin wax to protect them from moisture. Ammonite cannot be exploded by the application of a flame or safety fuse, a detonator being required. If ignited with a flame it merely burns.

Ammonite. Name of a fertiliser containing a high proportion of nitrogen. It is made from the offal of rendering establishments. The name is derived from ammonia, the nitrogen of the decomposed organic matter becoming ammonia gas. See Fertilisers.

Ammonites. A semi-savage people who inhabited the region S. of the Jabbok (Nahr ez-Zerka) and E. of the Jordan. Descendants of Ben-Ammi, son of Lot's second daughter (Gen. 19), and identified as the Beth-Ammon of the Assyrian inscriptions, their capital was Rabbah, or Rabbath-Ammon, in the 3rd century rebuilt by Ptolemy Philadelphus and renamed Philadelphia, amid the ruins of which stands the modern city of Amman. With their kindred the Moabites they were forbidden entry into the congregation of the Lord because they hired Balaam to curse Israel (Deut. 23; Neh. 13). Addicted to child-sacrifice, worshippers of Moloch, the Milcom of the O.T., and enemies of Israel and Judah, they were denounced by Amos and other prophets, defeated by Jephthah (Judg. 11), Saul (1 Sam. 11), David and Joab (2 Sam. 10-12), and Judas Maccabaeus (1 Mac. 5), and were absorbed, about the 1st century A.D., by the Nabataean Arabs.

Ammonium. In chemistry, the compound radical, NH_4 , contained in the ammonium salts, i.e. salts formed by neutralising ammonia by acids. Of the ammonium salts, ammonium chloride NH_4Cl , is formed by the action of hydrochloric acid, and is known as sal ammoniac. It is used as a flux in soldering, in the galvanising of iron and steel, and (very largely) as the activating agent in carbon-

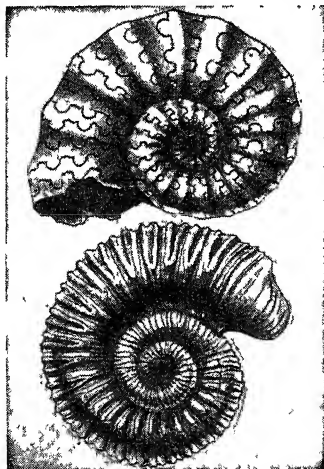
zinc electric cells (Leclanché type and the so-called dry cells). The chloride is made commercially from the ammoniacal liquor which is a by-product at gasworks. Ammonium carbonate— $(\text{NH}_4)_2\text{CO}_3$ —is made by passing carbon dioxide, ammonia gas, and steam into lead chambers or water. Known popularly as lump ammonia, the carbonate is used as a household cleansing agent; also for scouring wool. It is an ingredient of baking powders and smelling salts. Sal volatile is a solution in alcohol of the carbonate and ammonia. Ammonium sulphate, $(\text{NH}_4)_2\text{SO}_4$, is a gasworks product, obtained from the ammoniacal liquor. It is also largely obtained from synthetic ammonia. Its main use is as a fertiliser. Ammonium nitrate, NH_4NO_3 , is made by the action of ammonia on nitric acid. When heated, the nitrate breaks up into nitrous oxide (the gas commonly used as an anaesthetic by dentists) and water. Ammonium nitrate is a constituent of many explosives, e.g. ammonal (q.v.) and amatol (q.v.), and is used also as a fertiliser. Ammonium bromide, NH_4Br ; A. iodide, NH_4I ; and A. acetate, $\text{NH}_4\text{C}_2\text{H}_3\text{O}_2$, are used in medicine. Ammonium fluoride, NH_4F , is employed for etching glass and as a disinfectant. Ammonium picrate made by agitating picric acid with an excess of aqueous ammonia and crystallising out the picrate, is a military explosive.

Ammonius. Name of three Greeks of Alexandria.

(1) Ammonius Saccas (c. A.D. 175-242), generally regarded as the founder of neo-Platonism. He is said to have been a street-porter in his youth, whence his name Saccas, bag-carrier. Belonging to a Christian family, he reverted to paganism, and endeavoured to reconcile the different systems of ancient philosophy, especially those of Plato and Aristotle. Plotinus and Origen were his pupils. An excellent teacher and no mean orator, he wrote little and confined himself to oral instruction. Some ancient ecclesiastical authorities deny that he was originally a Christian.

(2) Flourished about A.D. 400. A teacher at Constantinople, he was the author of an extant work on the use of synonyms.

(3) The son of Hermias, flourished about A.D. 500. He was known for his commentaries on Porphyry and Aristotle, some of which are extant, and as a mathematician.



Ammonite. Specimens of a fossil marine mollusc allied to the nautilus

Triassic deposits of the Alps and Tirol and of the Salt Range in India, being descended from earlier coiled cephalopods found in the Palaeozoic rocks. They range through the Jurassic rocks of the world, occurring abundantly in Britain, but are less common and show less variety of form in the Cretaceous system, and become extinct in the early Tertiary period. See Fossils; consult also Yorkshire Type Ammonites, S. S. Buckman, 1919.

Ammonite. British safety explosive of the Favier type. In its original form ammonite consisted of ammonium nitrate 87 to

AMMUNITION: HISTORICAL & MODERN

Lt.-Col. A. Macgregor, Military College of Science

This article, classifying all the many modern types of military ammunition, is complementary to the one on Artillery, while other related articles include those on Armour; Bomb; Explosives; Fuse; Grenade; Small Arms

The word ammunition is derived from the Latin *munire*, to provide, through the French, in which *la munition* became corrupted to *l'ammunition*. Though it was formerly employed to indicate military stores of all descriptions, its present significance as a substantive is limited to warlike stores embodying explosive of any kind or used expendably in direct association with any form of explosive. The adjective in certain instances retains the significance of the older usage, as in "ammunition boots."

HISTORICAL. The introduction of explosives can be traced back to the first inventors interested in the possibility not only of breaking up large or small structures by the suddenly liberated energy of the explosive, but also of projecting missiles for distances greater than those attainable by purely mechanical devices. Early in the 14th century gunpowder was used to propel existing types of projectile, e.g. arrows, leather-bound to make them a reasonably close fit in the bore of the tubes from which they were projected. Spherical missiles, frequently of stone, appeared in 1340, to be replaced towards the end of the 16th century by metal cannon balls, usually of iron. Lead and iron bullets for small weapons appeared somewhat earlier.

The Rocket Principle

The possibilities that are inherent in rockets have always interested soldiers, and the application of the rocket principle has developed along lines parallel to the development of the gun. The mistake should not be made of considering the two developments as rivals in a race to achieve the same objective. The capabilities of each are distinct. Later were introduced special missiles, as opposed to the missile whose only offensive power was associated with its kinetic energy. These can best be reviewed individually.

Incendiary missiles first took the form of a projectile treated with an inflammatory coating which was ignited before or as the projectile left the gun. With the introduction of metal cannon, a more reliable effect was obtained by heating the cannon ball to red heat, the pre-ignition of the

propellant charge being prevented by the interposition of a suitable wad between the charge and the heated ball.

Case shot was an attempt to increase the anti-personnel effect of the projectile. It represented a development in shape also, since it was substantially in the form of a thin cylindrical body filled with small missiles. On leaving the muzzle of the gun, the case disintegrated and the contents were distributed over a considerable area fairly close to the gun. To some extent case shot was the forerunner of the shrapnel shell. In its simplest form it has survived for use in certain specific tasks at short range.

Grape shot was intended to produce a short range anti-personnel effect similar to that achieved by case shot; but there was no case.

With chain shot two or more missiles linked by a chain were loaded in the same piece and used where ropes, spars, and wires formed the target, as in the ships of the time. Here, again, the principle persisted until as recently as the First Great War, when it was regularly used against barbed wire entanglements.

Bursting shell, e.g. spherical shell filled with a charge of explosive to break them up, were employed as early as 1560. They were time-fused, and their anti-personnel effect was largely discounted by the almost inevitable delay in functioning after arrival. This allowed individuals in the vicinity to take cover. The difficulty was partly remedied in the middle of the 19th century by the introduction, firstly, of a time fuse which was ignited by a cap fired by the shock of discharge in the gun, and secondly, by the introduction of a percussion fuse, which caused the projectile to burst on impact with the target. The earliest types of shrapnel shell were spherical and filled with a mixture of bullets and gunpowder; later, with bullets and gunpowder separately.

MODERN AMMUNITION. The development of modern gun ammunition may be said to begin with the introduction, firstly, of the rifled gun, and, secondly, of the principle of breech-loading. The problems of the flight of a

cylindrical projectile, in regard to its stability and the air-resistance encountered, were solved by the production of a cylindrical projectile with a pointed head, having its centre of gravity towards the rear, and caused to follow the trajectory nose forward by imparting to it an adequate rate of spin about its longitudinal axis. The necessity for adequate spin presented mechanical problems as to how this could be imparted during the short time the projectile was accelerating in the gun.

The broad general principle consists in giving the bore of the gun a non-circular longitudinally twisted form, and by reason of the tight fit of the projectile in the bore, forcing the projectile to twist in the gun during its passage up the bore. Many proposals conforming to this principle were put forward. A gun with a hexagonal cross-section to the bore and a correspondingly formed projectile was suggested. Helical grooves (rifling) in the cylindrical surface of the bore were more usual proposals, the grooves to accommodate studs, a layer of soft metal surrounding the projectile or, the modern conventional solution, a ridge of soft metal being attached towards the rear of the cylindrical portion of the projectile, and commonly referred to as the driving band.

Breech-loading Weapons

The introduction of the breech-loading rifled gun, firing the pointed projectile, gave a considerable improvement in range and in ballistic performance, which set new standards for propellant efficiency and regularity that gunpowder was hardly able to meet. The evolution of the modern types of gun propellant dates from the latter third of the 19th century, and by 1900 the earliest of the present-day nitrocellulose powders and the double-based propellants (cordite) had appeared. Also the evolution of high explosives in the latter part of the 19th century and the development of large scale production introduced entirely new conceptions of explosives. From the effect upon tactics of more efficient weapons, and from the introduction of increased protection against artillery fire, modern gun ammunition has become increasingly specialised in character.

EXPLOSIVES. These can usefully be divided, considered as ammunition, into three groups:

(1) The propellants, used to eject a projectile from a gun.

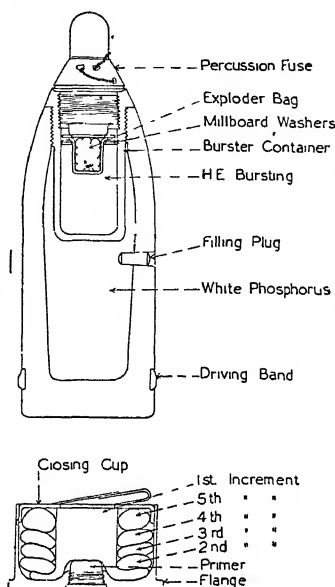
Propellants are composed of a combustible content associated with a source of oxygen to support the combustion, and their operation is essentially one of burning to produce a large quantity of hot gas. In modern propellants the fuel and the oxygen exist side by side in the same chemical substance, *e.g.* nitrocellulose, and consequently their behaviour is much more regular than that of gunpowder, whose fuel (charcoal and sulphur) is distinct from the source of oxygen (potassium nitrate), the components merely being finely divided and mixed intimately together. Propellants produce a conflagration which can be controlled by adjustment of the physical conditions obtaining. This is the basis of the ballistic regularity attained with modern guns.

(2) The high explosives, which differ fundamentally from the propellants in their application. The high explosive is properly so called when it can be caused to break down with great rapidity on being subjected to adequate mechanical shock. Such detonation takes place much more rapidly than does the burning of the propellant, with the consequence that the liberation of considerable energy, which occurs almost instantaneously, is much more destructive locally than when a similar amount of energy is liberated relatively slowly, as in the burning of a propellant. Detonation is in effect the passage of a high intensity shock through the material of the high explosive, and its rate of transmission is typical of the high explosive and is substantially uncontrollable.

(3) A miscellaneous class largely composed of the pyrotechnic compositions, with which it is convenient to class gunpowder. They are compositions which burn and which are employed for the purpose of producing effects other than the propulsion of projectiles. Examples are incendiary, smoke, and flare compositions.

TYPES OF GUN AMMUNITION
Modern gun ammunition falls into two main categories. The first is that known under the initials Q.F. (originally quick-firing), the distinguishing characteristic of which is the use of a metal case which performs the function of obturating the chamber of the gun, *i.e.* preventing the escape of the propellant gases past the breech block.

Q.F. ammunition is capable of sub-division into three sub-groups:



Ammunition. Typical bursting smoke field howitzer shell and cartridge

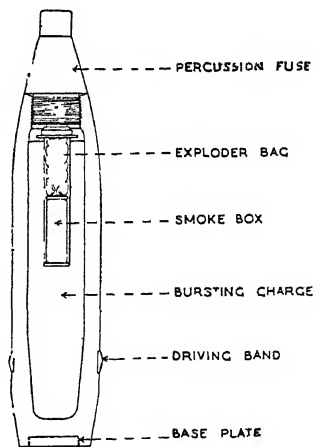
(a) Fixed Q.F. ammunition, in which the projectile is firmly attached to the mouth of the case and the entity so constituted loaded in one operation; (b) separate Q.F. ammunition, in which projectile and cartridge are supplied, handled, and loaded separately, the mouth of the cartridge being closed suitably to protect the contents; (c) semi-fixed ammunition, in which projectile and cartridge are separate or readily separable, but are assembled into a complete round for loading.

The second category is known under the nomenclature B.L. Originally these letters were an abbreviation for breech-loading, but this significance is now entirely lost. Instead, B.L. ammunition indicates ammunition in which the cartridge is not required to play any part in the obturation of the gun chamber, this being secured by the breech block. Thus a B.L. cartridge normally comprises a bundle of propellant contained in a fabric bag with an igniter attached.

In Q.F. cartridges the ignition is normally effected by means of a primer screwed into the base of the case. Primers may be operated by percussion, or electrically. The primer has a cap containing a composition sensitive to a striker blow (in percussion primers) or a filling sensitive to heat (in electric primers). The primer also has a

"magazine" containing gunpowder to build up the flash, and in modern primers a gas-sealing device to prevent the escape of gases rearwardly through the primer. The Q.F. cartridge may also contain an igniter to build up the flash in the chamber still further. Ignition in B.L. cartridges is effected by the agency of a tube, which is essentially a small Q.F. cartridge, with a flash-producing filling. The tube may be fired by the impact of a striker (a percussion tube) or by the passage of an electric current (an electric tube). The tube is held by means of a lock in the rear end of a central passage or vent passing through the breech block, and on firing projects flash into the gun chamber where it impinges on the igniter. The igniter, normally containing gunpowder, chosen partly because of its susceptibility to flash, is used to increase the flash in the chamber sufficiently to ignite the propellant uniformly.

ARTILLERY PROJECTILES. Projectiles in modern gun ammunition can be divided into three



Ammunition. Typical field Q.F. howitzer H.E. shell and cartridge

main classes: (a) shot; (b) high explosive shell; (c) carrier shell.

A shot is a projectile in which the effect at the target end is based entirely upon the kinetic striking energy of the projectile. A high explosive shell is used to carry a charge of high explosive to the target where at a selected instant it is detonated so as to produce a destructive effect by reason of the energy imparted to the shell case fragments, or of the blast created, or in some instances by utilising both results. High explosive shell may be thin-walled when not required to penetrate hard targets before detonation of the filling, in which case they are usually nose-fused, or they may be very strong with relatively small cavities when they are required to penetrate hard targets, such as armour plate, and to detonate effectively after penetration. The latter shell are called piercing shell, and are frequently made of special steel, with very strong noses. The fuses in piercing shell are arranged in the base (or rear) of the shell to protect them from the severe stresses to which the nose of the shell is subjected. Carrier shell are employed to convey a filling other than high explosive to a selected point and there to discharge it. Typical carrier shell are smoke shell, shrapnel shell, and star shell.

TRACERS. In some applications, the man at the gun wishes to follow the flight of the projectile with his naked eye. To enable him to do this the projectile may be provided with a tracer, or filling of pyrotechnic composition, which burns with a distinctive light of sufficient brilliance to be observable under the conditions of use. The tracer composition may be filled into a cavity in the base of the projectile, or it may be carried in a tracer body secured to the base of the projectile. Either way it is usually ignited by the propellant gases in the gun.

GUN AMMUNITION FUSES. The steady development of modern warfare methods has led to the development of an increasing number of types of gun ammunition fuses. These can be classified as follows.

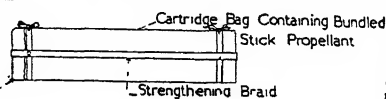
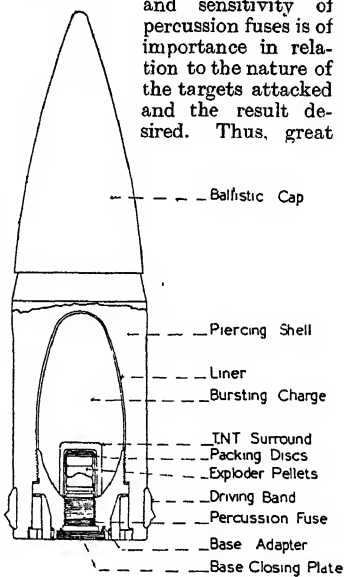
(1) *Percussion Fuses.* These are fuses which function on arrival at a target. There are two sub-divisions: (a) The direct action fuses, which require a blow on a member protruding at the nose of the projectile to cause the fuse to function; (b) The graze fuses,

which only require adequate deceleration in the direction of the nose of the projectile to cause the fuse to function.

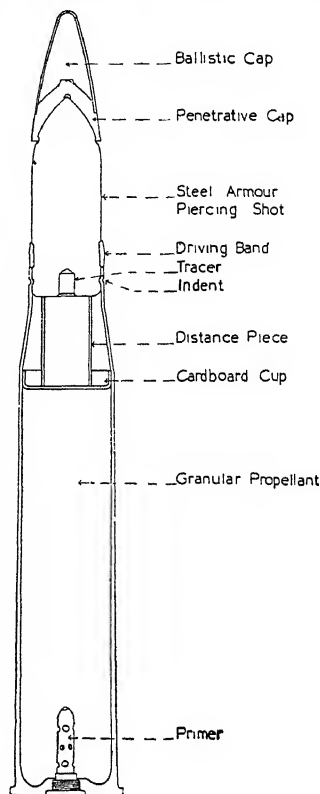
(2) *Time Fuses.* These are of two main types: (a) The combustion type, which rely upon the steady burning of a powder train the length of which can be varied to give a desired time of burning, so causing the shell to function at a pre-determined time after leaving the gun; (b) The mechanical type, which consist of a pre-set alarm clock which is started as the shell leaves the gun and triggers a firing mechanism at the time determined by the setting.

A percussion fuse may have a delaying mechanism designed to provide a short fixed delay in the final functioning of the shell at the target after the mechanical members in the percussion mechanism have been operated, thus allowing penetration of the target before detonation of the shell. All types of fuse may be either disruptive, i.e. suitable for use for the direct detonation of the high explosive filling in a high explosive shell, or igniferous, in which the explosive resulting from the fuse is flash suitable only for igniting the next component in the explosive train.

The speed of action and sensitivity of percussion fuses is of importance in relation to the nature of the targets attacked and the result desired. Thus, great



Ammunition. Diagram of an armour-piercing shell and cartridge



Ammunition. Typical anti-tank armour-piercing round

variation in both these characteristics is found between different designs of fuses of this class.

EXAMPLES OF GUN AMMUNITION AND CARRIER SHELLS.

(1) Q.F. cartridge with armour piercing shot for attack of armour. In small calibre high velocity guns for attack of armour, the alloy steel projectile with tracer incorporated is secured in the mouth of the cartridge case by indenting the metal of the case into a cannellure in the projectile.

(2) A B.L. round with a piercing shell. In this case the cartridge consists of propellant, usually of stick form, tied into a compact bundle and inserted into a strong, tightly fitting bag of suitable fabric. The igniter, suitably secured to the cartridge, normally takes the form of a thin layer of gunpowder carried in a suitable flat pocket of fabric. The projectile is a piercing shell with a base fuse which may have a delay (possibly optional) incorporated. The piercing shell may also have a penetrative cap of metal on the nose and also possibly a ballistic

cap to improve its ranging capabilities. The shell cavity is relatively small and is filled with a high explosive sufficiently insensitive to withstand the shock of impact on a hard target. The fuse is a base detonating fuse, and between it and the high explosive filling is a quantity of high explosive.

(3) A heavy anti-aircraft artillery cartridge. This is a fixed Q.F. round normally with a percussion primer in the cartridge. The shell is relatively thin-walled and is fused with a mechanical time fuse. To convert the flash from the fuse to detonation there is arranged below the fuse a component known as a gaine. Below the gaine is the exploder system and then the bursting charge.

(4) A light anti-aircraft artillery cartridge. This consists of a high explosive shell fitted with a very sensitive nose percussion fuse, and secured in a cartridge case to constitute a fixed Q.F. round. Equipments firing such cartridges are frequently fully automatic, and therefore to avoid covering friendly ground with a large number of lethal projectiles these are provided with a "self-destroying" system whereby, at a fixed time after leaving the gun, the projectile is broken up into fairly innocuous fragments.

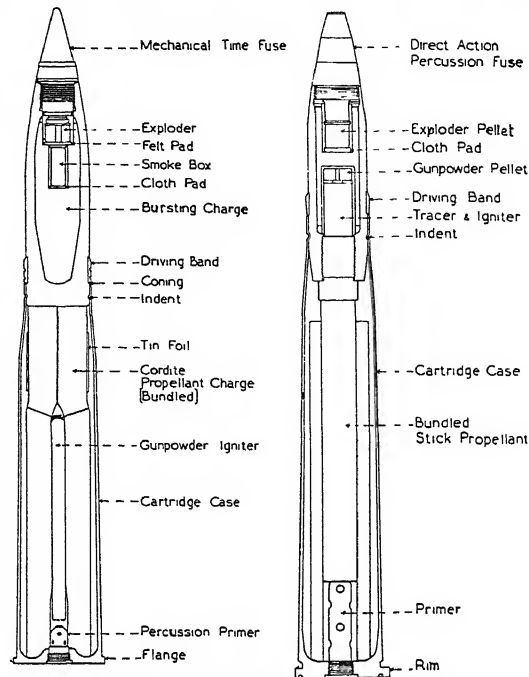
(5) A separate Q.F. cartridge with a nose-fused high explosive shell. Such a round can be used in field artillery guns, and has the advantage of ease of handling coupled with the possibility of varying the charge at will.

(6) The shrapnel shell. This consists of a steel body with a nose time fuse of igniferous character adapted to ignite a gunpowder charge in the rear of the shell cavity by way of a flash channel down the centre of the shell. Forward of the gunpowder charge and surrounding the flash channel is a compact mass of resin and lead balls. When the gunpowder charge is fired, the fuse, or the front end of the shell, deliberately weakened in its attachment to the remaining part of the projectile, is blown out and followed by the lead bullets

which spread in front of the shell case in a conically shaped distribution. The decline in the use of shrapnel is a result of the lengthening range of artillery and the tendency to use higher trajectories with steep angles of descent, both of which contribute to the difficulty of bursting the shell at a steady effective height, while the second tends to restrict the size of the area effectively swept by the ejected bullets. Moreover, experience shows that modern H.E. shell burst in the air can be more generally effective and cheaper than the corresponding shrapnel shell. Shrapnel is, however, retained in certain short-range high trajectory equipments where it can be fairly accurately burst, in which case it is useful against troops in entrenchments.

(7) The phosphorus smoke bursting shell. This is a percussion-fused shell in which in effect the cavity is filled with white phosphorus, and the shell functions on impact as the result of the detonation of a relatively small high explosive charge carried in a burster container at the nose of the shell.

(8) Star shell. These are, in principle, similar to shrapnel shell except that ejection of the contents is effected through the base of the shell instead of through the nose. The principle of base ejection is



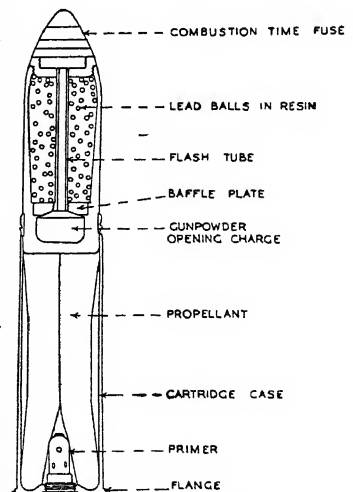
Ammunition. Sectional diagrams of (left) a heavy anti-aircraft round, and (right) a light anti-aircraft round

applied to a wide variety of carrier shell.

SMALL ARMS AMMUNITION. Although no definite limit exists, the term is applied in Great Britain to ammunition for rifles, machine-guns, pistols, machine carbines, and shot-guns of calibre up to and including one inch. Small arms ammunition has developed from a spherical ball of lead fired from a smooth bore weapon, by means of a charge of gunpowder ignited by a "match" or the spark from a flint, to the modern cartridge, a self-contained unit or round, consisting of an elongated enveloped bullet placed in the mouth of a brass or steel cartridge case, from which the bullet is discharged up the rifled barrel by one of the modern nitrocellulose or double base propellants ignited by the flash from a sensitive

composition carried in the cap at the base of the case.

The ball round, a lead alloy core enclosed in a copper alloy or steel envelope—the nomenclature remaining from the original spherical bullets—is useful only in hunting and for the attack of human beings and very light structures. Military requirements necessitate more specialised types of bullet. Tracer bullets are

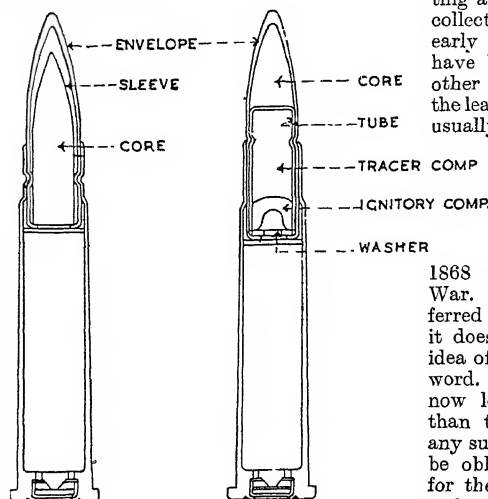


Ammunition. Q.F. field shrapnel round, a shell now seldom used

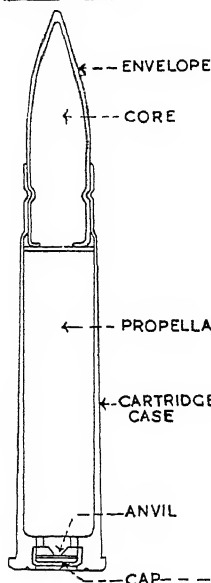
required in various types of machine-gun to indicate the relation between bullet trajectory and the target and so to make it possible to correct the aiming of the gun. Armour-piercing bullets to penetrate light armour, e.g. gun shields, have a hard steel core surrounded by a lead sleeve: this assembly is enclosed in

ARMOUR PIERCING

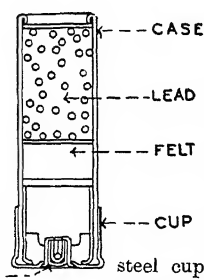
TRACER



BALL ROUND



SHOT GUN CARTRIDGE



attack of small game, are used under much less stringent conditions than most other types of small arms ammunition and consist of a quantity of lead balls or shot carried in a cardboard case which is reinforced at the base by a brass or steel cup and a compressed paper wad. The propellant—gunpowder is still used in many of these cartridges—is separated from the shot by a felt wad and is ignited by a cap fixed in the base of the cartridge.

ARMOUR PIERCING

TRACER

Ammunition. Sectional diagrams of four types of .303 small arms cartridges as used in the British Services during the Second Great War. See Bullet

the normal metal envelope, while, in order to attack modern aircraft successfully, 20-mm. ammunition is produced to much the same design as artillery shells with a nose fuse and a filling of H.E. and incendiary composition. In smaller calibres, in which fuses cannot be used, incendiary ammunition has been developed to ignite the petrol which occupies a large volume of all military aircraft.

Pistol and machine carbine ammunition designed for short-range attack differs from the rifle and machine-gun types in having a much smaller propellant charge to project a comparatively heavy bullet at low velocity. Shot-gun cartridges, fired from a smooth bore weapon and designed for the

Amnesty (Gr. *amnestia*, forgetting an offence). Term used for a collective or general pardon. From early Greek times such pardons have been granted to rebels and other offenders against the state, the leading culprits, however, being usually excluded. Most governments have granted amnesties, famous instances being the amnesty promised by Charles II on his restoration in 1660, and that declared in 1868 after the American Civil War. The former was also referred to as an indemnity, though it does not carry quite the same idea of total oblivion as the Greek word. Indemnities are granted now less to deliberate offenders than to public servants who, in any sudden crisis in the state, may be obliged to transgress the law for the common good.

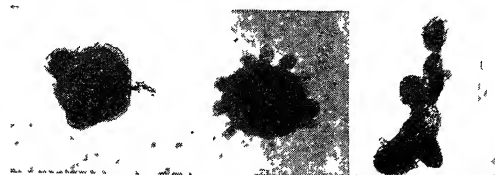
Amnion (Greek, little lamb).

Term in embryology and natural history denoting an anatomical structure found in mammals, birds, and reptiles. The amnion is the innermost membrane which envelops the embryo during development. See Anatomy.

Amoeba (Gr. *amoibe*, alternation). Genus of the Protozoa, or lowest forms of animal life. Of the several species most are common in the mud and decaying vegetable matter of ponds. While some can just be seen with the naked eye, others are much more minute.

The amoeba, a one-celled organism, consists of a tiny shapeless mass of protoplasm, resembling a minute blob of jelly. It has no limbs or appendages, but can push out parts of its substance, which are termed pseudopodia (Gr., false feet), and by this means flows forward rather than crawls. Its shape is constantly varying. It is rather firmer on the outer margin than within, and contains numerous granules of a proteid or fatty nature and a central nucleus. Possessing no mouth or other aperture for ingestion or excretion, it takes in its food, which

consists of diatoms and other minute vegetable matter, by flowing over and around it. When the process of digestion is complete, the residue is then pushed out through any part of the amoeba's substance.



Amoeba. The method of progression of this minute organism is (left) to extend a part of its substance and to continue the process (centre) until it gradually attenuates its mass in one direction (right)

Photomicrographs, J. J. Ward

Small cavities or vacuoles may be seen in the cell substance, and these appear to perform an excretory function.

When full-grown, the amoeba splits in two, and thus forms two individuals in the place of one. This form of reproduction by fission takes place in many of the humblest types of animal life. Occasionally two individuals coalesce and spores are formed, in which case the process of reproduction is less simple. The method of reproduction by splitting has given rise to the paradox of the immortality of the amoeba. As the process goes on indefinitely, it follows that all the amoebae in existence are simply fractions of the original amoeba of long ago, which still exists in them, because they have not descended from it but split off from it. But it does not follow that an individual amoeba cannot perish before it has had time to split and multiply itself. One species causes dysentery.

Amoebean Verse (Gr. *amoi-baios*, alternate). Metrical dialogue, in which the interlocutors answer each other in alternate lines on the same subject. It is a familiar device in pastoral poetry, illustrated by Virgil in his Eclogues and by Theocritus in his Idylls. See Poetry.

Amok or **AMUCK**. Homicidal frenzy prevalent among Malays. Under its influence the Malay runs through the streets indiscriminately laying about him with his kris until he is killed. Some cases are due to sudden madness, to disease, to the heat of the peninsula, and to the use of drugs. The typical amok may be connected with the wish to die fighting.

In Malay vernacular the word means to attack furiously. Both word and mania may have originated in India, where cases of running amok have been known from early times. In 1634 Shah Jahan, Mogul emperor of Delhi, narrowly escaped death at the hands of a raja who had run amok. Early travellers in the East refer to certain desperadoes in Malabar as amouchi or amuco, and in the 17th century the term amar-khan was applied to men who, in accordance with local custom, attempted to kill in open assembly the zamorin (chief) of Calicut after a reign of twelve years. English writers have sometimes regarded the "a" as the indefinite article, cf. Dryden, "And runs an Indian muck at all he meets." and Byron, in Don Juan, "running mucks."

Amol. Town of Mazanderan province, Persia. It is situated on

the Heraz, which flows into the Caspian on its S. side.

Amontillado. Wine grown at Montilla, near Cordova, Spain. Akin to sherry, usually light in colour, sweet, and full-bodied, it is subdivided into *fino* and *oloroso*, the former being the more delicate, the latter having the greater bouquet.

Amor (Lat., love). In Roman mythology, the counterpart of the Greek Eros. He was the son of Aphrodite (Venus) and the god of love. See Cupid.

Amore. In music, the Italian words *con amore* (literally, with love) mean tenderly, lovingly.

Amorites. Semitic race who settled in Palestine about 2500 B.C. They were allied to and



Amorites. Typical heads of a conquered western Asiatic race, from ancient sculpture
British Museum

sometimes identified with the Canaanites, who may have succeeded them in a wave of immigration. The Babylonian dynasty of Hammurabi was Amorite. The Amorites settled in the highlands of Palestine and Syria, and were conquered by the Israelites, who, under Moses, overcame Og and Sihon, and, under Joshua, smote other Amorite kings at Beth-horon (Deut. 3; Josh. 10). The Amorites are referred to in Assyrian, Babylonian, and Egyptian records. See Early History of Syria and Palestine, L. B. Paton, 1902; Amurru, the Home of the Northern Semites, A. T. Clay, 1909; The Empire of the Amorites, A. T. Clay, 1919.

Amoroso. Italian word used in music for *con amore*, lovingly.

Amorphous (Greek *umorphos*, formless). Term in chemistry applied to solids which exhibit no crystalline structure. Amorphous phosphorus is one of the forms of phosphorus which has no regular structure. An amorphous alkaloid cannot be obtained in a crystalline form. In geology the term is applied to continuity of mass or absence of stratification or cleavage.

Amortisation (Fr. *mort*, death). Financial term meaning the extinction of a capital liability, such as bonds and debentures. These may be redeemed periodically by annual drawings, the money being

provided by a sinking fund, or purchased in the market and cancelled, or extinguished by a single payment to creditors. In law, amortisation means the transfer in perpetuity of lands to a corporation.

Amos. Shepherd of Tekoa, Judah, and earliest of the Hebrew prophets whose writings are extant. He lived in the days of Uzziah and Jeroboam II (c. 750 B.C.). Wealth and luxury had demoralised Israel and Judah, and the poor were oppressed. Insisting that Jehovah was God of the whole earth, Amos foretold that the Day of the Lord was to be a day of judgement on the Hebrews and surrounding nations. Amaziah, chief priest of Beth-el, tried in vain to suppress him. The book of Amos, which closes with anticipations, perhaps from a later hand, of a larger hope, is marked by clear, vigorous, and picturesque diction, imagery of country life, and a remarkable power of social observation. See Amos and Hosea, W.R. Harper, 1910.

Amour Médecin, L' (Love, the Doctor). Title of a comedy ballet by Molière. Produced at Versailles, Sept. 15, 1665, it was sketched, written, learnt, and acted in five days. The character of Sganarelle—the doctor and widower who does not wish his daughter to marry—was acted by Molière. The comedy is in three acts, and is a skit on the medical profession, four well-known Parisian doctors of the period being amusingly caricatured. The scene is Paris and the airs were by Lully. In a note to the reader Molière made use of the often-quoted remark that "comedies are written only to be acted."

Amoy. City and former treaty port of China, in Fukien prov. Standing on the island of Haimen (Hiamen), at the mouth of the Lung-kiang, its walls date from the Ming dynasty. The East India Company first traded here in 1670, and it was one of the five ports to be opened to foreign trade by the Treaty of Nanking (1842), but a customs station was not established until 1862. The foreign settlement is on a small island $\frac{1}{2}$ m. distant, the waterway between the two islands forming the inner port, one of the best harbours on the coast. From 1899 the Japanese had a separate concession at Tiger Hill to the S. of the city. Amoy, formerly important as a tea centre, had, up to 1939, an extensive foreign trade, of an annual value of over £2,500,000. It exported sugar, camphor, paper, and various other articles. There was steamer communication with Hong-Kong and

other Chinese ports. The city was occupied by the Japanese, 1939-45. Pop. (1936) 234,159.

Ampere. Practical unit of electric current. The international standard ampere, defined 1908, is that current which when passed through a 15 per cent solution of silver nitrate in water deposits 0.001118 grammes of silver per sec. The "absolute" ampere (in force from Jan. 1, 1948) equals 0.99985 of the international ampere. It was named after André M. Ampère.

Ampère, ANDRÉ MARIE (1775-1836). French scientist. Born at Lyons, Jan. 22, 1775, his genius for



A. M. Ampère,
French scientist
A. Tardieu, 1835

mathematics was marked at an early age. In 1793 his father was guillotined, and from that time until 1801, when he began to teach at Lyons, young Ampère devoted himself to science. He moved to Paris, 1805, became a member of the Academy of Sciences, 1814, and professor in the Collège de France, 1824. He died at Marseilles, June 10, 1836. His great work was to establish the nature of the connexion between electricity and magnetism and to work out the theory of electrodynamics. His only son, Jean Jacques Ampère (1800-64), was a philologist and traveller.

Ampersand. The name of the sign &, frequently used for "and." It is of mongrel, Latin and English, origin, being a contraction of the four words—and, *per se* (by itself), and. In form, it is a combination of the letters e and t, *et* being the Latin word for and.

Ampezzo. A district in Tirol. The people are Ladins. The chief place in the area is Cortina d'Ampezzo, which is situated in the Dolomites, 25 m. S.E. of Bressanone. It is 4,000 ft. high and a tourist centre. The Ampezzo pass, crossed by a carriage road, runs from Toblach to Cortina at an alt. of 5,000 ft. The Ampezzo valley is surrounded by several of the finest summits of the Eastern Alps, notably Monte Cristallo, 10,495 ft.; the Sorapis, 10,595 ft.; Monte Antelao, 10,710 ft.; and Monte Civetta, 10,565 ft.

Amphiaraus. In Greek legend, brother-in-law of Adrastus, the prime mover in the Argive expedition against Thebes. Amphiaraus, being possessed of the gift

of prophecy, desired to take no part in it, knowing that he was doomed to perish. He went into hiding, but his wife Eriphyle, bribed by Polynices with the necklace of Harmonia, revealed his whereabouts. During the flight of the Argive chiefs from Thebes Amphiaraus and his chariot were swallowed up by the earth. After death he was worshipped as a god.

Amphibia OR **BATRACHIA** (Gr. *amphibios*, living a double life). In zoology, one of the chief classes into which the Chordata or back-boned animals are divided. They include frogs, toads, newts, salamanders, and certain wormlike forms such as the caecilians. In their earlier stage they usually have gills and live in the water, while the adults are provided with lungs and can live on land.

In almost all cases the life history of amphibia consists of a series of metamorphoses. The eggs are usually laid in fresh water, and generally connected in a jelly-like mass or string. They are hatched by the heat of the sun, and the young in their larval stage possess a long flat tail, by wriggling which they swim freely. External branched gills at first exist, and in some species persist during a considerable part of the animal's life. The limbs presently begin to appear. In frogs and toads the tail is gradually absorbed; in newts and salamanders it becomes modified. A change in the length of the intestinal canal marks the change from vegetarian to flesh diet.

Amphibians have a naked and soft skin, with glands which secrete a milky fluid. A dog that has picked up a toad exhibits great symptoms of distress and cannot be induced to repeat the experiment. Though the secretion has little effect on the human skin, it will often produce serious symptoms if injected into the blood. Amphibians do not drink, but absorb moisture through the skin, and cannot exist unless the skin be kept moist. Hence they are almost invariably found in damp places or near water. In dry localities they keep out of the sunshine during the day and move about at night, when the dew is on the ground. Many amphibians change the hue of their skin to suit their surroundings. If a frog is placed in a white box exposed to the light, and another in a black box, the former soon becomes lighter in colour than the latter.

Amphibians are found in nearly all parts of the world, and there are about 900 known species.

They are specially abundant in the swamps of the tropics. None can endure salt water, and their presence on an island points either to their accidental introduction or to the island having been connected with the mainland. Their chief food consists of insects, worms, slugs, and other small animals. Thus frogs and toads are useful in a garden. They can live for a long time without food, and many species hibernate. The stories told about toads and other amphibians having been found imbedded in solid rock or coal are due to inaccurate observation. They cannot live without air, or without food for more than a year or so.

Fossil Amphibia

The chief fossil representatives of the amphibia belong to the order Stegocephalia, or roof-headed, so called from the heads being covered with bony plates. They first appeared during Lower Carboniferous times, and their remains are preserved in rocks of this age in W. Europe, but they reached their maximum development in Permian times. Many of these animals were small and externally resembled lizards; such are well represented in the coal-bearing rocks of Nova Scotia and in the Lower Permian of Saxony and Bohemia. The larger Stegocephalia or labyrinthodonts appeared first in the Coal Measures and attained their maximum in Permian times. They are well represented in the Permian rocks of Prussia and Texas, and also occur in the Triassic rocks of S. Africa and Australia. In Britain and Germany large footprints on the bedding-planes of Triassic sandstones may be attributed to these animals. Consult Tailless Batrachians of Europe, G. A. Boulenger, 1897-98; Amphibia and Reptiles, H. F. Gadow, 1901 (Cambridge Natural History, vol. VIII).

Amphibious Craft. Craft designed to carry troops, equipment, or stores during invasion by sea or in fording rivers during land operations. As developed and used by the Allies in Europe, Asia, and the Pacific during the Second Great War, these craft included amphibians such as the "duck," "buffalo," and "weasel." U.S.-British amphibious craft played a conspicuous part in the success of the N. Africa landings (Nov., 1942), the invasion of Sicily and Italy (1943), and the great assault against the Germans in France and Holland (1944). They were employed also in the Pacific by American forces in the

invasion of islands held by the Japanese and in Burma by the British 14th army.

The LVT (Landing Vehicle, Tracked), known as the alligator, 20 ft. long, was used for assault purposes, particularly in the Pacific. It was able to swim through the surf by fluke-like tracks for water traction and to climb on to beaches with a 55-degree angle of climb. This craft was lightly armoured and carried machine-guns. The water buffalo, a development of the LVT, was in effect an amphibious tank. It

has six wheels and a propeller. Belonging to the same class, the water weasel was a tracked, half-ton truck. LCM (Landing Craft, Mechanised), 50 ft. long, were used chiefly for landing tanks, trucks, bulldozers, and guns. LCVP (Landing Craft, Vehicle, Personnel), 36 ft. long, primarily used for ship-to-shore work in landing infantry, formed part of the British contribution to the evolution of special ships and craft for amphibious operations that subsequently became standard equipment for the U.S. navy. A

in somewhat slender prisms, but occasionally assume a fibrous habit, as in asbestos. A certain number of the amphiboles contain an appreciable amount of soda.

Amphibrach (Gr. *amphi*, on both sides; *brachys*, short). In prosody, a trisyllabic foot with a long, or accented, syllable set between two that are short, or unaccented. The Latin *āmārē* is a quantitative amphibrach, the English revealing is an accentual amphibrach.

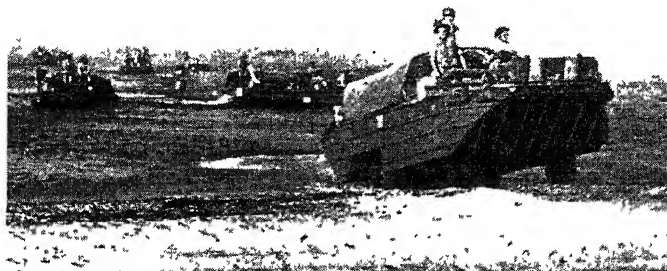
Amphictyonic Council (Gr. *amphictyones*, dwellers around). Representative council in ancient Greece of neighbouring states originally united in worship at a common temple. Such a council met at Delos and was in existence in the 7th century B.C. or earlier. The most important consisted of twelve states, and its first shrine was at Anthela, near Thermopylae, but at a later date Delphi became its headquarters.

The council for these states was composed of 36 members, three from each state, and Athens was at one time represented on it. The council pledged itself to the protection of the temple, and mutual defence of its members. This council continued for some time after the beginning of the Christian era. See Greece: History.

Amphimacer (Gr. *amphi*, on both sides; *makros*, long). In prosody, a trisyllabic foot with a short, or unaccented, syllable set between two long, or accented, syllables. The Latin *mīlētēs* is a quantitative, the English pantaloan an accentual amphimacer.

Amphion. In Greek mythology, son of Zeus by Antiope, wife of Lycus, king of Boeotia, who had divorced her in favour of his second wife Dircē. Amphion and his twin brother Zethus were placed when born on Mt. Cithaeron, but there they were found and brought up by shepherds. On reaching manhood the two brothers learned of the cruelty of Lycus and Dircē to their mother, and avenged her by killing them both, Dircē being tied to the horns of a bull. Obtaining possession of the city of Thebes, where Lycus reigned, they erected fortifications, the stones, it is said, moving to their places when Amphion played on the lyre, an accomplishment learned in his youth from Hermes. The group of statuary called the Farnese Bull, now at Naples, represents the punishment of Dircē.

Amphioxus (Gr. *amphi*, on both sides; *oxus*, sharp). Scientific name for the primitive fish commonly known as lancelet (*q.v.*).



Amphibious Craft. Punt-like army amphibious trucks, known as "ducks," in which Canadians landed at Reggio, Italy, on Sept. 3, 1943
Photo, British Official

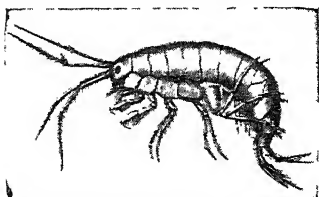
carried a 37-mm. cannon and two 0.50 machine-guns. Smaller than the alligator, the buffalo was used at Arnhem (*q.v.*), in Holland, in Sept., 1944, when both ducks and buffaloes, laden with ammunition and food for the relief of the encircled 1st airborne div., negotiated the German-held fen and dyke country. Out of the trapped force of some 8,000 men dropped in the Arnhem area, about 2,000 were ferried by buffalo across the lower Rhine to the British lines. The buffalo also proved of the utmost value during the fighting in other flooded areas of Holland in 1944 and 1945. LCR (Landing Craft, Rubber) was a rubber craft with a 7-man or 10-man capacity. It could be packed in a small space and inflated in 30 seconds. It was used for landing infantry groups and for reconnaissance and river crossings.

Among the best-known of the amphibious craft were ducks, so called from their factory serial letters DUKW. These army amphibious trucks, used for landing troops and weapons and carrying 20 men or the equivalent in cargo, were first used in the S.W. Pacific, and subsequently during the landings in Europe, notably in the assault upon the Normandy beaches in June, 1944. Shaped like huge punts, they had

vast fleet of these craft was assembled on the W. bank of the Rhine, and manned by British and American naval personnel during the storming of that river in March, 1945.

Amphibole (Gr. *amphibolos*, ambiguous). Group of minerals, complex silicates of calcium, iron, and magnesium, with or without aluminium. They are natural crystalline substances, which enter largely into the composition of certain igneous and metamorphic rocks. Those members of the group containing aluminium, and including common hornblende, are most usually found in igneous rocks such as diorites, hornblende-syenites, hornblende-andesites, and certain lamprophyres, to which they give distinctive characters. The non-aluminous amphiboles rich in iron and magnesia, *e.g.* actinolite, as well as those containing much calcium, *e.g.* tremolite, are more common in metamorphic rocks, respectively in altered igneous and calcareous rocks.

With the exception of aegirine, which is triclinic, and of anthophyllite, which is orthorhombic, all these minerals belong to the monoclinic system. They are mainly of various shades of brown and green, those richest in calcium being palest in colour. They usually occur crystallised

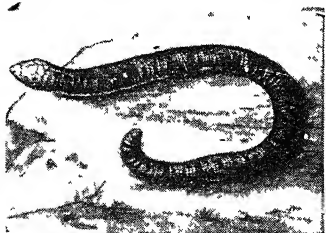


Amphipoda A fresh-water shrimp, typical example of the order

Amphipoda (Greek *amphi*, around; *pous*, foot). Order of small crustaceans with laterally compressed bodies. They have usually six pairs of legs, of which the anterior three are swimming limbs the posterior being specially developed for use in jumping. They are found in salt and fresh water, fresh-water shrimps, sand hoppers and beach fleas being familiar examples. See Crustacea.

Amphipolis (Gr. *amphi*, round; *polis*, city). A town of ancient Macedonia. Formerly called Ennea Hodoi, nine ways, it was situated between two arms of the Strymon. After several attempts the Athenians overcame the original Thracian inhabitants and founded a colony in 437 B.C. Taken by the Spartan Brasidas in 424, Amphipolis refused to return to its allegiance to the mother country. It maintained its independence until 358, when it was occupied by Philip of Macedon, and remained Macedonian until 168, when it came into the hands of the Romans, who made it the capital of one of their four Macedonian provinces. Favorably situated, in an important strategic position, with its excellent harbour Eion, and rich in oil, timber, gold and silver, it was a flourishing town. Referred to in Acts 17, it is represented by the modern Neokhori.

Amphisbaena (Greek *amphis*, both ways; *bainein*, to go). Group of lizards which have the power of moving equally well backwards or

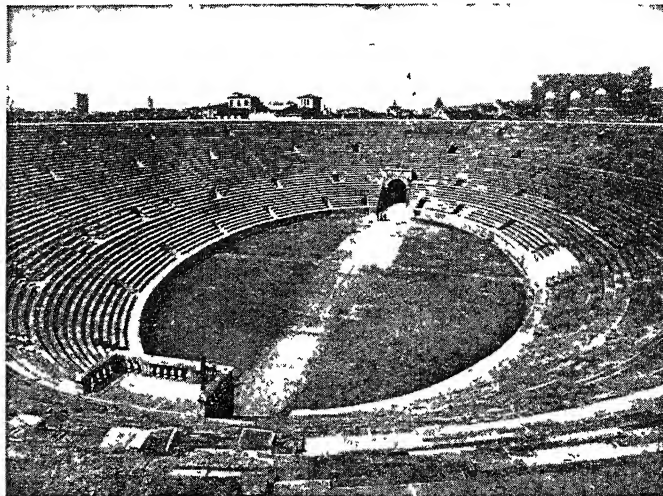


Amphisbaena. A. Americana, one of the legless lizards from Central America

forwards. The true amphisbaenas are found in Central America and in Africa, and include some thirty species. They are wormlike in appearance and live underground. One species has external limbs.

Amphitheatre (Greek *amphi*, around; *theatron*, seeing-place or theatre). Structure, slightly elliptical in form, specially designed for the gladiatorial exhibitions of the ancient Roman world. The structure was built round an open space reserved for the combatants. This space, the *arena*, was separated from the spectators' portion (*cavea*) by a wall (*podium*) sufficiently high to protect the spectators from the wild beasts introduced into

form a special women's gallery. Amphitheatres were originally built of wood, the first in Rome being erected by Gaius Scribonius Curio in 59 B.C. The first stone one was built by Statilius Taurus in 29 B.C. The most notable was the Colosseum, or Flavian amphitheatre, built by Vespasian and Titus, to hold some 50,000 spectators. Part of the Colosseum is still standing, and in all parts of the Roman empire in Europe examples



Amphitheatre at Verona Italy. Built about the first century A.D., but little remains beyond the interior, the seating of which has been often restored

the arena. At each extremity of the arena were doors in the *podium* through which the gladiators and the wild beasts from their subterranean cages entered. From behind the *podium* the spectators' seats rose in tiers. These tiers were divided into several sections (*moeniana*) by concentric gangways, and at intervals in the back wall of the gangway were openings for ingress and egress (*vomitoria*). The *vomitoria* led from the *cavea* into corridors, from which staircases descended to the ground outside the amphitheatre. Opposite the *vomitoria*, cutting the *moeniana* at intervals, were long flights of steps, by which the spectators passed to and from their seats. The *moenianum* nearest the arena was reserved for people of consequence, while the section farthest away from the arena was roofed over in order to

of the amphitheatre, in greater or less degree of preservation, are to be found. The amphitheatre at Verona is the best preserved. Other remains are at Arles and Nîmes, France, and Dorchester, England. Gladiatorial shows in the amphitheatre were prohibited in A.D. 404, but contests with wild beasts continued for more than a century afterwards. The term is now applied in the modern theatre to rows of seats immediately below the gallery. See Colosseum.



Amphitrite, wife of the Greek sea-god Poseidon
Villa Albani, Rome

Amphitrite. In Greek mythology, wife of Poseidon, the sea god and herself goddess of the sea.

Amphitryon OR AMPHITRYON. In Greek mythology, a Theban prince whose wife Alcmena gave birth to Heracles (Hercules), Zeus (Jupiter) having visited her in the form of her husband. The story forms the subject of comedies by Plautus, Molière, and Dryden. From the reference in Molière's play, the name has come to mean a host or entertainer. Jupiter, representing Amphitryon, gives a banquet, during which the real Amphitryon arrives. A slave, called in to settle the question of identity, decides that "Le véritable Amphitryon c'est l'Amphitryon où l'on dîne," that is, the real master of the house is the giver of the banquet. Molière's comedy, in three acts, was based on a French adaptation of Plautus. It was produced at the Palais-Royal, Paris, Jan. 13, 1668, Molière playing Sosia, Amphitryon's slave.

Amphora. Ancient earthenware vessel, with two handles and tapering to a point at the bottom, which was fixed in a stand or in the ground. It was chiefly used for keeping wines, and later as a cinerary urn. The amphora was also a measure of capacity, and was the standard for estimating the carrying capacity of ships, just as the ton is the standard now. The Greek amphoreus held approximately nine gallons; the Latin amphora six.

Ampleforth. Village of Yorkshire (N.R.), England, 9 m. E. of Thirsk, on the S. slope of the Hambleton Hills. The Roman Catholic public school for 350 boys was founded in 1802, having been transferred from Dieulouard, Lorraine. The Benedictine priory of S. Lawrence is modern.

Amplifier. Apparatus used in radio sets and in other electronic appliances to magnify electrical impulses passing through the circuits. Low, or audio-frequency, currents (for sound reproduction) and high, or radio-frequency, currents are passed through thermionic valves, each valve amplifying the output current of the previous one. Sound-reproducing apparatus,

such as public address systems and telephone equipment, use amplifiers; in much other apparatus amplifiers are employed to increase the strength of otherwise feeble aural or visual indications. See Radio; Sound Reproduction.

Amplitude. In astronomy, the space in degrees by which a star or other celestial body rises wide of due E. or sets wide of due W. In the theory of waves and vibrations, amplitude is a term expressing the height of the wave, or the extent to which the vibrating body deviates from its mean position.

Ampthill. Urban district and market town of Bedfordshire, England. It lies 8 m. S.S.W. of Bedford, is on the rly., and has an old church, S. Andrew's, restored in the 19th century, some almshouses, ironworks, and a brewery. Ampthill castle, now destroyed, was the residence of Catherine of

Aragon just before her trial. Built in the 15th century by Lord Fanhope, it became crown property, was later in the possession of Lord Ashburnham, and still later of the Russell family. The ambassador, Lord Odo Russell, took his title from here. Ampthill House was long the residence of his family, and its park is famous for its oaks and limes. There is a home for retired Oxford college servants at Ampthill. Pop. 2,167.

Amptill, ODO WILLIAM LEOPOLD RUSSELL, 1ST BARON (1829-84). British diplomatist. Born at Florence, Feb. 20, 1829, the son of Lord George William Russell, he was privately educated and began his diplomatic career in 1849 as attaché at Vienna, and later filled various diplomatic posts—in Paris, Vienna, Constantinople (under Lord Stratford de Redcliffe during the Crimean war), Washington, and Rome. From 1858-70 he was unofficial minister at the Vatican. In 1870 he was made assistant under-secretary for foreign affairs, and in Oct., 1871, was appointed ambassador at Berlin. In 1872 he was made a privy councillor and in 1881 raised to the peerage. He died Aug. 25, 1884, at Potsdam.

His eldest son, Arthur Oliver Villiers Russell, 2nd baron, was

born in Rome, Feb. 19, 1869, and educated at Eton and New College, Oxford, where he achieved reputation as an oarsman. He served as governor of Madras, 1899-1906, and acting viceroy of India, 1904. He was a leading freemason, being pro-grand master of the Grand Lodge of England at the time of his death, July 7, 1935.

Ampulla. Vessel used by the Romans to contain liquids. It was in the shape of a bottle, sometimes with handles and sometimes without, and was employed for holding the oils with which both living and dead were anointed. It passed for a like purpose



Ampulla used at English coronations

into the service of the Christian Church, and the ampulla is still the name of the vessel containing the consecrated oil or holy cream used in the Roman Catholic and Greek Churches in certain of the sacraments, e.g. confirmation, and at coronations. That used at English coronations is of gold, in the shape of an eagle with outstretched wings. The word is Latin, a diminutive of amphora (q.v.).

Medically, an ampulla means any flask-like dilatation, such as the dilated end of the semicircular canal of the ear. Inflammation of an ampulla is known as ampullitis.

Amputation (Latin *ambi*, round; *putare*, to prune, trim). Removal of some portion of the body which is injured or diseased in such a way as to endanger the patient's life or to preclude any hope of its restoration to a normal or useful function.

Previous to the discovery of anaesthesia it was necessary to perform amputations in the shortest possible time. Now, however, the operation can be carried out without hurry. Amputations of different limbs, and of organs, e.g. the breast, require different methods for their performance, but an essential feature in all cases is to leave flaps of sufficient tissue and skin which, after allowing for their contraction in the process of healing, will provide an adequate covering for the severed end of the bone and closing of the wound. The danger of haemorrhage can be avoided by the application of pressure on the blood vessels above the site of the amputation



Amphora. A fine example of Greek red-figure ware
British Museum

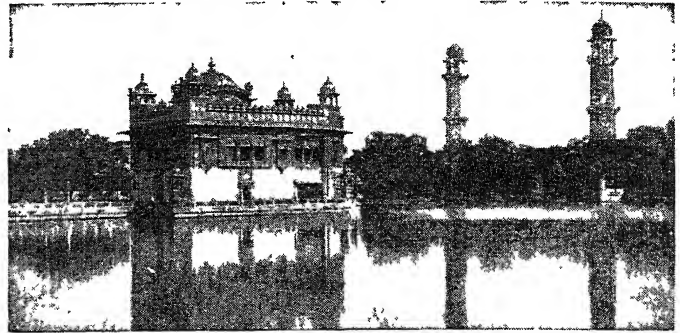
by means of tourniquets and similar devices.

The dangers following amputation are shock, secondary haemorrhage, and septic infection. Shock can be reduced to a minimum by skilful administration of the anaesthetic, injection of saline solutions, if necessary, and administration of stimulants. Secondary haemorrhage is a fresh bleeding from the vessels, occurring a few hours or days after the operation has been completed, a serious condition almost always due to septic infection of the wound, though now rare because antiseptic methods have reached so high a degree of excellence.

As regards special amputations, the removal of a finger is frequently required after machine accidents, and is attended with little risk; amputations of the forearm are relatively simple and usually satisfactory; disarticulation at the shoulder joint is a more serious operation. Amputations of the toes, foot, and lower part of the leg are generally unattended by complications, but amputation through the thigh is a severe operation, and disarticulation at the hip-joint is always one of great gravity. Amputation of the breast is an operation frequently performed for cancer, and when the disease is limited is not seriously dangerous; extension of the disease, however, to the arm and other parts may necessitate an operation of considerable magnitude and difficulty. Amputation of the uterus (womb), or part of that organ, also most often performed for cancer, has resulted very satisfactorily. *See* Surgery; Anaesthesia.

Amraoti OR **UMRAWATTEE**. A town in Berar, Central Provinces, India. The capital of Amraoti district, it is 6 m. N. of Badnera junction on the Great Indian Peninsula Rly. It is situated in the valley of the Purna, a tributary of the Taptis, at the end of an extensive alluvial plain. A great cotton mart and grain market, it is famous for its temples, that of Bhawani being 1,000 years old. Amraoti district has an area of 4,733 sq. m. and contains numerous steam factories for the ginning and pressing of cotton, as well as many cotton mills. There is a college affiliated to Nagpur university. Three-quarters of the people are Hindus. Pop. 74,309.

Amrāvati OR **AMARAVATI**. Ruined Indian city, in Kistna district, Madras, near Dharanikota, on the right bank of the Kistna,



Amritsar, India, religious centre of the Sikhs. The Golden Temple standing by the Pool of Immortality

20 m. N.W. of Guntur. One of the centres of the Buddhist kingdom of Vengi, its tope (monument) is famous. The carvings, illustrating the life of Buddha, are preserved in the British and Madras museums.

Amreli. Division and town of the former state of Baroda, India. In Kathiawar peninsula, a few miles N. of the Satrunji river, the town is a cotton-trade centre; the div. covers 1,347 sq. m.

Amritsar. District and city of India, in the E. Punjab province. The area of the district is 1,601 sq. m. The city is 32 m. E. of Lahore, on the North-Western rly., and is the religious centre of the Sikhs, the site of the Golden Temple, with its tank or Pool of Immortality, having been chosen by Ram Das, the fourth leader of the sect, in 1574. Amritsar has carpet, cashmere shawl, and silk manufactures, and was long a trading centre for Kashmir and the N.W. Frontier province. Pop. 391,000.

Grave rioting took place in the city April 10-11, 1919, following the removal of two agitators; the mobs burned banks, government buildings, and rly. premises. On April 13 troops commanded by Brig.-Gen. Dyer fired on a large meeting of unarmed persons, of whom 400-500 were killed and about 1,500 wounded. The "massacre" was the subject of a public enquiry, which condemned Dyer's action. (*See* Dyer, R.E.H.)

When in 1947, at the partition of India, Amritsar city and dist. were included in the E. Punjab prov. of India, there was much violence and bloodshed, and almost the entire Muslim pop. (about 50 per cent of the total) fled from the city. The arrival of refugee Sikhs from W. Punjab, Pakistan, added to the confusion, the life of the city was brought to a standstill, and its prosperity suffered for some time.

Amrom OR **AMRUM**. One of the North Frisian Islands. Off the

W. coast of Slesvig, it is about 10 sq. m. in area, and at low water can be reached by vehicle. To the N. of Amrom lies Sylt, and to the N.E., Fohr.

Amru-el-Kais. Author of the first of the Mo'allakat or collections of the best poems of certain writers. He flourished in the 6th century A.D. and was regarded by Mahomet as the most distinguished of Arabian pre-Islamic poets. Sir William Jones included Amru-el-Kais's poems in the translation of the seven Mo'allakat which he brought out in 1783. The word Mo'allakat means exalted.

Amshaspands. Six immortal holy ones of Persian mythology. They are associated with Ormuzd in ruling the world.

Amstel. River of the Netherlands. Formed by the union of the Drecht and the Mydrecht, it flows to the Zuider Zee, through Amsterdam. It is about 10 m. long.

Amstelian. In geology, a division of the Pliocene system as occurring in Holland, and the equivalent of the Red Crag of the east of England. It has many fossils of Arctic affinities.

Amsterdam (Latin *Amstelredamum*: formerly Amstelredam, dyke of the Amstel). The commercial capital, largest city, and a seaport of the Netherlands: area 18½ sq. m. In the prov. of N. Holland, it



Amsterdam arms

is on the Amstel river, where it joins the IJ or Y, an inlet of the Zuider Zee.

A fishing village before 1200, Amsterdam was a town with many privileges when William the Silent united the provinces in 1585. It benefited by the commercial ruin of Antwerp in the second half of the 16th century, and it was constantly vitalised by refugees, who

found it an asylum. The establishment of the Dutch East India Company in 1602 made it the foremost mercantile city in Europe, and its fortunes suffered little visible decline until the English wars of 1780-84. The Prussians entered it in 1787, the French in 1795, and during 1806-13 it was incorporated in the French empire.

The site being fen, the city is built on piles. Based on the Y, the oldest portions lie round the Dam, a great square. Later extensions are marked by concentric crescents of house-lined canals (*grachten*), some filled in (*gedempt*), which form its main structural lines. The harbour and docks were remodelled and extended in the North Sea Canal construction begun in 1872, from which also date three artificial islands containing the central railway station and numerous quays. In 1585 the walls ran along the old Singel and Kloveniers Burgwal. By 1600 the crescent Heeren-gracht marked the line of the city walls. These enclosed the Schreyerstoren or "Weepers' Tower" (1482) at the original harbour; S. Anthonie's Waag (weigh-house); the Oude Kerk (Old Church, c. 1300), behind the Warmoesstraat; and the Nieuwe Kerk (New Church, 1408), beside the palace on the Dam. Coronations are held in the Nieuwe Kerk. The palace, magnificent within, but lacking every domestic convenience, was built in 1648-55 by Jacob van Kampen as a town hall, and still belongs to the city. During the 17th century Amsterdam expanded, by the stately Heeren and Keizer-grachts or avenues, as far as the present Lynbaans-gracht, including the French exiles' quarter (c. 1612), with streets and canals named after flowers, and hence known as De

Jordan, from the French *le jardin* (the garden). Since then the city has overflowed in new suburbs, sometimes of a rather dreary meanness, but often laid out with beautiful canals and spacious parks. Many handsome new buildings were erected in the period between the two Great Wars.

Before the German occupation in the Second Great War, Amsterdam was Holland's chief money market and an important European mercantile centre. With good harbourage and wide-reaching ocean traffic, it was hampered in shipping and transport by difficult access to the open sea. To remedy this were undertaken the North-Holland (1819-25) and North Sea (1865-95) canals. The harbour was protected by a fort at its entrance, but the city depended for security against attack principally on a system of dykes and sluices, whereby the surrounding district could be readily inundated.

Besides tobacco, rice, spices, and other colonial produce, timber, petroleum, grain, ores, coal, and drugs were largely imported. Diamond polishing was at one time almost Amsterdam's monopoly, but latterly a considerable part of the industry had moved to Antwerp, production costs being cheaper there. Other industries were shipbuilding, engineering, sugar-refining, printing, brewing, dyeing, and the making of glass, clothing,

paper, cocoa and chocolate, aeroplanes and bicycles, oils, cements, and chemicals. In addition to extensive sea, river, road, and tram communications, the city was closely linked up with Holland's network of inland canals. From Amsterdam's airport at Schiphol, 6 m. S.W. of the city, regular services were operated to other European cities and to the Netherlands East Indies.

Normally the city's administration is vested in a burgomaster, wethouders (aldermen), and a municipal council. It is represented in the Second Chamber on the principle of proportional representation. Rates are high, hence very many Amsterdammers reside in other communes. Amsterdam has a full educational equipment on the Dutch model. The old university, with a library of 350,000 vols., dates from 1632; a second, denominational, was opened in 1880.

There are several theatres. Music is much cultivated, though there is no opera-house. There are three sports stadiums. The narrow



Amsterdam. Below, the Open Harbour, showing Prins Hendrik quay on the left and the railway station on the right. Top right, picturesque old houses in rose-red brick and, behind, the Church of S. Nicholas

Kalverstraat is historical as a burgher promenade, where newspapers in all languages can be seen at the cafés.

Amsterdam's chief glory is associated with Dutch art. In the Rijks (National) Museum (1808; present building 1877-85, but since extended) is the most representative collection of Dutch painting in the world, with examples of Dutch sculpture and ecclesiastical art. Other galleries are the Municipal Museum, the Fodor the Six, and Rembrandt House. The city has a botanic garden and one of the finest zoological gardens in Europe. Vondel and Bredero, Holland's greatest poet and greatest comic dramatist respectively,



Amsterdam. Plan of the central part of the Dutch commercial capital, termed "Venice of the North." It is one of the principal seaports of the Netherlands

were natives of Amsterdam, and Spinoza was born (1632) in its Jewish quarter, where Rembrandt lived for over twenty years. The population at the census of 1939 was 793,526.

During the Second Great War less immediate damage was sustained by Amsterdam than by other cities of Holland. But on the day of the German invasion, May 10, 1940, the city was heavily raided by German bombers. Serious fighting broke out in the streets during the following days, and the capital was occupied by the Germans on May 15. After that date the R.A.F. repeatedly bombed the harbour and oil tanks. In Feb., 1941, following riots, the Germans imposed upon the city fines amounting to £2,000,000. Deportations of workers to Germany made a steady drain on the population throughout the years of occupation. The Jewish population, 100,000 in 1940, had declined to 10,000 by 1945.

In the final months of the war in Europe the city, in common with the rest of Western Holland, suffered from lack of food, and the death rate from starvation rose alarmingly. Relief came only with the liberation of the entire Netherlands in May, 1945.

AMSTERDAM OR NEW AMSTERDAM. Island in the Indian Ocean. Lying almost equidistant from S.

Africa and Tasmania, it is an extinct volcano, 2,980 ft. above sea level, with an area of about 25 sq. m. Discovered by Van Diemen in 1663, and acquired by France in 1893, the island is barren and uninhabited.

Amu-Daria. River of Central Asia. It rises on the Pamir plateau in two headstreams, the Ab-i-Panja and the Ak-su or Murghab, and during its course of about 1,500 m. forms part of the boundary between Afghanistan and first Tadzhik and then Uzbek S.S.R., whence it takes a general N.W. trend to enter the Aral Sea by two main branches. It is less utilised as a commercial waterway than for irrigation. At Leninsk it is crossed by the Trans-Caspian Rly. It is the ancient Oxus and the Persian Jihun.

Amulet. Object worn as a charm against evil. Researches in Babylonia, Assyria, and Egypt have brought to light a vast number of specimens, of which the scarabaeus and the eye of Isis are familiar examples. It has been suggested that phylacteries, containing extracts from the Law of Moses, were worn by the Hebrews not only as tokens of piety, but also as amulets. Mahomedans wear small cases containing extracts from the Koran. In Italy the peasants very commonly wear little figures of animals, or a closed

hand with extended index and little finger representing the sacred horns, as charms against the Evil Eye. In Great Britain flint arrowheads and small pebbles with holes in them served a similar purpose. While the superstitious use of the amulet was condemned by the Church in the 8th century, the wearing of Christian symbols as amulets has always been common. See Evil Eye.

Amulree, WILLIAM WARREN-DER MACKENZIE, 1ST BARON (1860-1942). British judge and labour mediator. Born August 19, 1860, near Perth, he was educated at Edinburgh University, and University College, London, and was called to the Bar in 1886. He was president of the Industrial Court, 1919-1926, and successfully conducted a number of inquiries into industrial matters and arbitrations of trade disputes. He was chairman of the Royal Commissions on licensing laws and Newfoundland. In 1929 he was raised to the peerage, and in the following year became secretary of state for air in the 2nd Labour govt. He died at Winterbourne Stoke, Wilts., May 5, 1942.

Amundsen, ROALD (1872-1928). Norwegian explorer. Born at Borje, July 16, 1872, the son of a shipowner, Amundsen, after studying medicine, went to sea. About 1901 he joined an exploring expedition into the Arctic seas. In 1905 he led a party through the North-West Passage, and in 1910 set out in the Fram for the northern seas, but changed his mind and sailed for the Antarctic. He remained there for over a year, and on Dec. 16, 1911, reached the South Pole, the first man to do so. After his return he wrote a book, *The South Pole*, 1913, and lectured on his travels. In 1918 he started on a North Polar expedition, reaching Nome, Alaska, in July, 1920. He crossed the North Pole from Spitzbergen to Alaska in an Italian-built airship piloted by Gen. Nobile, May, 1926. On June 18, 1928, he left Tromsø, Norway, in a seaplane, to search for traces of the missing Gen. Nobile and his Arctic expedition. Months later bits of floating wreckage from his plane told of his tragic end. Consult Roald Amundsen, Explorer, C. Turley, 1935.



Roald Amundsen, Norwegian explorer



Amur River, near Nikolaievsk, the town near its mouth. It flows into the sea opposite the northern end of the island of Sakhalin

Amur. River of Asia. Known also as the Sakhalin-ula and the Heilung Kiang, it is formed at Ust-Stryelka by the union of the Argun and Shilka, which rise in the Stanovoi Mts. In its upper course the Amur proper follows a S.E. direction and separates Manchuria from the Far Eastern prov. of Amur, and, after receiving the Sungari from the S., flows N.E., passes Khabarovsk, forces its way through the Khingan ranges, and enters the sea at Nikolaievsk, opposite the N. end of Sakhalin island. Frozen for half the year, it is navigable by large steamers for 1,500 m. from May to Oct. Besides the Sungari, its chief tributaries are the Ussuri on the S. and the Zeya, Bureya, and Amgun on the N. It is 2,920 m. long from the source of the Argun; the Amur proper is 1,800 m.

Amur. Name given to part of the Far Eastern Region of the U.S.S.R., lying between the Stanovoi Mts. on the N. and the Amur river, which marks the entire S. boundary. Its area is 154,795 sq. m. From the lofty plateau in the N.W. the surface falls away to a series of fertile plateaux, bounded on the E. by the Little Khingan Mts., beyond which occurs a broad strip of marshy lowland. There is rich pasture and much soil suitable for cultivation, but the climate—severely cold in winter and wet in summer—is against agriculture, which nevertheless gives employment to about one-third of the people. Gold is worked extensively in the vicinity of the Stanovoi Mts., and coal of a poor quality is mined in the basins of the Zeya, Bureya, and Silinja. The rly. from Stretensk to Khabarovsk traverses the S.W. of the area, and one branch goes to Blagovyeschensk, chief town of the area. Amur was ceded to Russia by China in 1858.

Amurath. Variant of the name Murad, borne by five sultans of Turkey. See Murad.

Amurnath. Cave in the mts. of N.E. Kashmir. About 30 yds. high, with a depth of 20 yds., it is reputed to be the dwelling-place of the god Siva, and is a favourite resort of pilgrims.

Amyclae. Ancient Greek town of Laconia, 2 m. S.E. of Sparta. The reputed home of Castor and Pollux, the Amyclaeans brothers, and originally the chief town of the Achaeans, it long maintained its independence after the Dorian conquest. A tomb of its princes contained two gold cups, magnificent examples of Mycenaean art, found at Vaphio, and the bronze statue of Apollo in his temple was famous.

The Italian Amyclae, on the Lago di Fondi (*Lacus Amyclanus*), on the coast of Latium, destroyed about the fifth century B.C., was supposed to have been founded by Greek colonists from Laconia.

Amygdalin (Greek *amygdalē*, almond). A glucoside discovered in 1830 by Robiquet and Boutron-Charlard in bitter almonds to the extent of 2.8 p.c. to 4 p.c. It is also contained in peach kernels (2.35 p.c.), cherry kernels (0.82 p.c.), and other vegetable products. To prepare amygdalin, bitter almonds are pressed to extract the fixed oil, and the cake remaining is boiled with alcohol, from which the amygdalin crystallises on cooling. By the action upon amygdalin of a ferment known as emulsin, also contained in almonds, glucose, hydrocyanic acid, and benzoic aldehyde (bitter almond oil) are formed. These are the flavouring agents in cherry brandy, noyau, ratafia, and maraschino.

Amygdaloid (Greek *amygdalē*, almond; *oidos*, form). Geological name for a lava in which most of the steam-cavities have been filled with mineral matter since the lava became solid. These secondary mineral masses are known as amygdaloids, from the fact that they are often almond-shaped. Steam-cavities in a lava, lengthened in the direction of flow, and not filled with secondary material, are known as amygdaloidal cavities. See Vesicles.

Amyl (Gr. *amylon*, starch) or PENTYL. Alcohol radical of the pentacarbon series. The term amyl alcohol may be applied to eight different isomeric compounds. Fusel oil is amyl alcohol and is obtained in the rectification of alcohol, particularly that prepared from potatoes. A mixture of alcohols, chiefly iso-amyl alcohol, with varying amounts of active amyl alcohol and smaller quantities of other alcohols, is used in the manufacture of synthetic rubber, and as a solvent for pyroxylin varnishes. Fusel oil is more poisonous than ordinary alcohol and has a more lasting effect. Amyl acetate is known as jargonelle pear oil and is used for flavouring purposes. Amyl valerate has the flavour of apples. Amyl nitrite when inhaled produces sudden dilatation of the blood vessels, and is used in medicine to relieve angina pectoris. See Alcohol; Rubber, Synthetic.

Amyloid or LARDACEIN (Gr. *amylon*, starch; *eidos*, form). Albuminoid formed in the disease known as waxy degeneration of the liver and spleen. It gives the same colour reaction with iodine as starch, and on this account Virchow named it amyloid. Vegetable amyloid is prepared from the cell wall of plants.

Amylopsin (Gr. *amylon*, starch; *opsis*, appearance). Name of a ferment secreted in the pancreas or sweetbread. It acts on starch in the process of digestion, converting it into maltose, a form of sugar.

Amyot, JACQUES (1513-93). A French ecclesiastic and scholar. Born Oct. 30, 1513, at Melun, he was educated at the universities of Paris and Bourges. He became tutor to the sons of Henry II of France and was made bishop of Auxerre. Except for the



Jacques Amyot,
French scholar

hostility of the Leaguers, who suspected him of complicity in the assassination of the duke of Guise, Amyot led a peaceful life, occupied with the affairs of his diocese and his famous translations of classical authors. These include Heliodorus's Theagenes and Chariclea, 1547; seven books of Diodorus Siculus, 1554; Plutarch's Lives of Illustrious Men, 1559 (on which North's translation, used by Shakespeare, was founded); and Plutarch's Morals, 1572. Amyot died Feb. 6, 1593.

Anabaptists (Gr. *anabaptizein*, to baptize again). Title of a fanatical Protestant sect that arose at Zwickau under the leadership of Thomas Münzer in 1520. The name was taken from one of their doctrines, which rejected infant baptism and required rebaptism in later life. Hence it has been applied occasionally to other sects which hold this particular tenet, and throughout the 16th century was used indiscriminately for all Protestants whose doctrines appeared to be subversive of ecclesiastical and political order.

The original Anabaptists held that the existing order ought to be destroyed and a new divine order substituted, which should do away with all inequalities and private property, ideas which developed into a negation of all moral laws. Münzer's doctrines helped to bring about the Peasant Revolt in Germany in 1525. He himself was put to death, but the Anabaptists were not suppressed. In 1533, led by John of Leiden, they took forcible possession of the town of Munster. John asserted that he was a king, the successor of David, and that his actions were dictated by heavenly visions. Polygamy and other excesses were practised. In 1535 the town was recaptured by the German prince-bishop and John and his chief followers were executed. As an actual sect the Anabaptists disappeared. See

Rise and Fall of the Anabaptists, E. B. Bax, 1903.

Anabasis (Gr., going up). Historical work by the Greek general and writer Xenophon. In 401 B.C. Cyrus the younger collected a force at Sardis in Asia Minor to attack his elder brother Artaxerxes, king of Persia. The backbone of this force consisted of some 10,000 Greek mercenaries under Clearchus, with whom Xenophon served as a volunteer. The force reached the interior, and gained a victory in the battle of Cunaxa, in which, however, Cyrus was killed. The Greek generals having been treacherously murdered by the Persians, the command devolved upon Xenophon. In a masterly retreat, famous as the Retreat of the Ten Thousand, he led his fellow countrymen through difficult and often hostile country back safely to the coast after a journey of five months. The sea was reached at Trapezus, the modern Trabzon. The style of Xenophon's narrative is conspicuous for its simplicity and directness. Anabasis is also the title of Arrian's account of the campaigns of Alexander the Great.

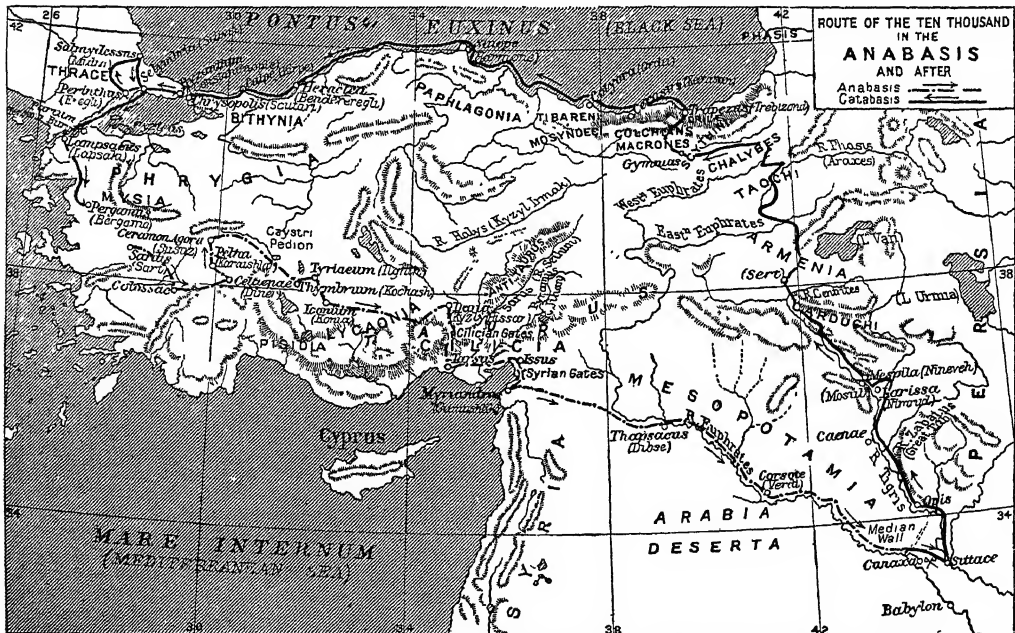
Anableps. Small fresh-water fish of the family of Cyprinodontids, found in Central and S. America, and remarkable for the structure of the eye which enables it to see both above and below the water. It swims on the surface, and the

eyes, which project strongly, are each horizontally divided by a band or partition into two parts for vision in the air and the water respectively. Hence its popular name of *cuatro ojos* or the four-eyed fish.

Anabolism (Gr. *anabolē*, anything thrown up). In biology, the chemical and physical processes involved in building up simple substances into complex ones by a living organism. The primary anabolic processes in plants are the syntheses of organic matter from inorganic substances. In all organisms the ultimate anabolic processes result in protoplasm. See Metabolism.

Anachronism (Gr. *ana*, back; *chronos*, time). Assignment of events or things or persons to a period earlier or later than that to which they actually belong. Literature abounds in examples of such mistakes in fact, especially in historical drama and fiction, owing to imperfect acquaintance with the more or less remote period dealt with or to mere carelessness.

Where the work is poetical and not primarily intended to give an historically exact picture of a period, mistakes of this kind are relatively unimportant. A far more serious mistake is made by those who insist upon strict accuracy in fact as a cardinal principle, but yet attribute to a period a style of language and a mode of thought which belong to their own time.



Anabasis. Map showing the march, generally called the Anabasis, of the Ten Thousand Greeks under Cyrus the younger, 401 B.C., from Sardis to Cunaxa, and the return, known as the Catabasis, to Trapezus, with the route thence to Pergamus, as described by Xenophon, who led the retreat

Anacoluthon (Gr. *anakolouthos*, not following). Inconsistent construction of a sentence, in which the writer or speaker passes from one form of construction to another before the first is complete. It is often deliberately employed for the sake of effect, but is more commonly the result of carelessness—e.g. having opened the window, the candle went out.

Anaconda. A snake of the python or boa family, a native of Brazil and Guiana. Brown in colour, with large black spots on the back and smaller ones with white centres along the sides, it is 25 to 30 ft. long one of the largest snakes in the world, certainly the largest in the American continent. It inhabits the forest rivers and preys upon animals and birds.

Anaconda. City of Montana, U.S.A., the co. seat of Deer Lodge county. It is 27 m. N.W. of Butte. The copper-smelting works of the Anaconda Copper Mining Co. are the largest in the world. They are

genuine extant fragments are distinguished by grace and charm, but lack depth of sentiment. At a much later date a collection of pieces, tasteless imitations of the real Anacreon, was published under his name. They were translated by Cowley and Moore, but are undoubtedly spurious.

Anacrusis (Gr. *ana*, up; *krouein*, to push). In prosody, an upward beat of one or more short, or unaccented, syllables before the beginning of the proper rhythm. Thus, if

He en | ded and | a bit | ter m | terval
be scanned

He | ended | and a | bitter | inter | val,
in the second example *He* becomes an anacrusis.

Anadyomene (Gr., rising). In Greek mythology, a name given to Aphrodite (Venus). It refers to her supposed birth from the foam of the sea. See *Venus*.

Anadyr. River of the Far Eastern Region of the U.S.S.R. Rising in the Yablonoi Mts., it

flows S.W. and then E. through a desolate, thinly populated region, collecting several tributaries in a course of nearly 500 m., and emptying in the Gulf of Anadyr. The gulf, which forms part of Bering Sea, is a resort of whalers. Anadyr is also the name of a town,

chief place of the Chukchi people.

Anaemia (Gr. *an-*, not; *haima*, blood). Although the term means strictly "absence of blood," it is usually applied to conditions in which there are deficiencies in the composition of the blood. Anaemia is not a disease by itself, but a symptom of abnormality elsewhere in the body. The modern tendency is to divide the anaemias into three classes, depending on the cause of the condition: (1) Anaemias due to failure or abnormality in blood-production; (2) anaemias due to abnormal loss of blood, e.g. following acute or chronic haemorrhage; (3) anaemias due to excessive destruction of blood, e.g. caused by infections or chemical poisons.

An example of the first class is seen in the simple anaemia of infants, which is due to deficiency of iron in otherwise healthy subjects. The anaemia usually starts gradually and is more common in premature infants and those of low

birth-weight. Children so affected are generally more susceptible to infections such as recurrent colds, diarrhoea, enteritis, etc. Treatment consists of administration of iron and attention to the diet.

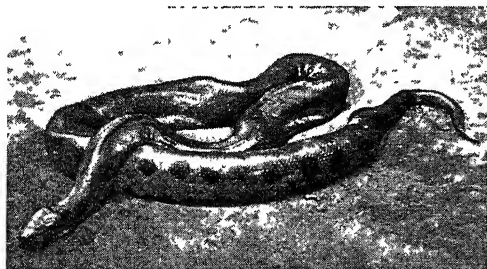
In the 19th century one of the commonest anaemias affecting young females was "chlorosis." The disease generally begins between the fourteenth and seventeenth years and was frequently found among ill-fed girls who did not obtain sufficient fresh air and exercise. The improvement in living conditions and the more active and wholesome life led by women probably account for the disappearance of the disease.

The Liver Diet

The treatment of pernicious anaemia, a disease of adult life occurring most frequently above the age of 40, and affecting men and women alike, underwent a dramatic change in 1926 when Minot and Murphy discovered the effect of the liver diet. Pernicious anaemia, as understood at present, is a deficiency disease due to the lack of a specific substance found especially in liver. Isolated in 1948 and called by some scientists vitamin B₁₂, it is as specific in the treatment of pernicious anaemia as insulin is in diabetes. Symptoms of pernicious anaemia include gastro-intestinal disorders, nervous disturbances, and general weakness. Treatment consists in giving adequate amounts of the specific factor. It is no longer necessary to rely on the inclusion of fresh liver in the diet, as various dry extracts and solutions are available as well as preparations for injection. In 1929 it was demonstrated that dried hog's stomach was as valuable as liver, but this substance can be given only by mouth.

The anaemia associated with sprue, a disease occurring most frequently in tropical and sub-tropical countries, is also due to deficiency of the factor lacking in pernicious anaemia. Treatment is by adequate doses of liver extract. Another disease in which anaemia is a symptom, and which is caused by deficiency of an essential factor, is scurvy, the cause being lack of vitamin C.

Anaemias following haemorrhage may result from sudden or repeated loss of blood, from haemophilia, or from other causes. Anaemias due to increased destruction of the red cells of the blood often follow infections, e.g. malaria, or the absorption of a chemical poison such as lead.



Anaconda, a large snake of the python family, sometimes 30 ft. in length. It is a native of South America

principally fed by the Butte mines, also owned by the company. The giant stack of the smelter, one of the largest in existence, is the most conspicuous artificial object in the Deer Lodge Valley. Zinc, manganese and chrome are also produced, and other industries are iron and brass founding and the manufacture of railroad equipment and machinery. The city stands over 5,300 ft. above sea level. Pop. 11,004.

Anacreon (563–478 B.C.). Greek lyric poet. He was born at Teos in Ionia, and fled before the invading Persians to Abdera in Thrace. Later he lived at the court of Polycrates, tyrant of Samos, until 525, then under the Peisistratidae at Athens, and perhaps lastly in Thessaly. He is said to have died at the age of 85, choked by a grape-stone. He wrote in the Ionic dialect. His language is simple, like that of everyday life, and his themes are love, wine, dancing, and enjoyment. The

ANAESTHESIA: ITS ORIGIN AND USES

K. M. Woodruff, M.B., M.R.C.S

The history of the use of anaesthetics in surgery and particulars of the various drugs employed in producing a state of anaesthesia, general or local, are here reviewed. Consult also articles on Chloroform; Cocaine; Ether; Laughing Gas; Surgery, etc.

Anaesthesia (Greek, *an-*, not; *aisthēsis*, feeling) is the term used to describe a loss of feeling or sensation in the whole or part of the body. Anaesthesia may result from injury to, or disease of, the brain or nerves, but is generally understood to mean the condition produced artificially by means of certain drugs which are known as anaesthetics.

HISTORY. From the earliest times man has sought to assuage grief and pain by dulling consciousness. The different methods first employed were the inhalation of fumes from different substances, swallowing or injection of various drugs such as poppy or hyoscyamus or alcohol, or pressure applied to important nerves and blood vessels, or hypnotism. Homer in the *Odyssey* says: "Helen dropped into the wine a drug, an antidote of grief and pain to lull all sorrow and induce oblivion to all ills." Herodotus (c. 484-425 B.C.) told of the custom of inhaling the fumes of hemp (*Cannabis indica*) to produce intoxication. In the second century A.D. the physician Galen wrote of the power of mandragora to paralyse sensation and motion; and later, Lucian, the Greek writer, referred to the narcotic effects of mandragora. The Chinese were the first to use Indian hemp (hashish) to dull consciousness of pain.

The use of anaesthetics in the modern sense started in the middle of the 19th century. In 1772 Joseph Priestley (*q.v.*) discovered nitrous oxide, and in 1800 Sir Humphry Davy suggested the use of the gas as an anaesthetic; but it was not until 1820 that Henry Hill Hickman, a young physician, began to experiment on animals by causing them to inhale carbon dioxide and, later, nitrous oxide gas.

The discovery of anaesthesia proper introduces the names of four investigators in America: Crawford W. Long, of Georgia; W. T. G. Morton, of Hartford; Horace Wells, of Hartford; and Charles T. Jackson, of Boston. In 1842 Crawford Long performed the first painless operation under ether for a tumour of the neck, but did not publish the results. In 1844 Horace Wells had a tooth extracted under nitrous oxide

and he used this gas upon his patients with such good effect that he gave a demonstration at the Harvard University medical school. The exhibition, however, was a failure, and so disheartened him that he later committed suicide.

In 1846 W. T. G. Morton, a student under Wells, was familiar with the use of nitrous oxide, and while serving as a medical student under Charles Jackson, a chemist, was induced by the latter to use ether instead of nitrous oxide. Morton did so, and gave a successful demonstration at the Massachusetts general hospital. The method was brought to Great Britain the same year, the first operation under ether anaesthesia being carried out at University College Hospital, London, by Robert Liston.

Chloroform, which largely replaced ether for a time in Great Britain, was introduced by Sir James Young Simpson, an Edinburgh obstetrician, on the recommendation of Waldie, a chemist of Liverpool, as an inhalation for the relief of childbirth pains.

LOCAL ANAESTHETICS. The drugs are applied to, or injected into, or around the part to be operated upon. Extensive areas of the body can be anaesthetised in this manner, consciousness being retained throughout. In 1867 Sir B. W. Richardson introduced the ether spray with the object of freezing the affected part. Of greater importance was the introduction in 1884, by Karl Koller of Vienna, of the first local anaesthetic, cocaine, an alkaloid occurring in the leaves of *Erythroxylon coca*, a shrub native to South America. More recently, however, other less toxic drugs have been introduced, such as procaine, novocaine, nupercaine, amethocaine, eucaine, and stovaine, as well as other combinations such as quinine and urea.

Various techniques are employed for the administration of local anaesthetics, *e.g.* surface anaesthesia, in which the drug is applied to a mucous surface such as that of the eye, nose, throat, and genital organs; infiltration anaesthesia, which aims at paralyzing the nerve endings at the site of operation; and regional anaesthesia, in which the nerve trunk

supplying the sensory nerves in the area to be operated upon is affected by creating a block in the path of these nerves at a point remote from the field of operation. A more extensive type of block called spinal anaesthesia consists in the production of anaesthesia in the lower extremities and in the lower part of the body below the diaphragm by the injection into the sub-arachnoid space of the spinal cord of a drug which paralyzes the spinal nerves, as they enter and leave the spinal cord. This was first attempted in 1896 by August Bier, a Greifswald surgeon, but it was not brought into general use until 1906. The main disadvantage of spinal anaesthesia is that it may cause a severe fall in blood pressure. Freezing of small areas of skin with ethyl chloride spray is in common use, and larger areas, such as the limbs, can be rendered analgesic by refrigeration, in which crushed ice is packed round the limb.

BEFORE OPERATING. Drugs given to patients before operations have two main actions. They diminish the flow of mucus and saliva resulting from the use of some general anaesthetics, and they produce drowsiness, thus allaying anxiety. The drugs most commonly employed are morphine, atropine, and scopolamine (hyoscyne), given about an hour before operation. Scopolamine and morphine are the active agents in twilight sleep used for obstetrical analgesia.

BASAL ANAESTHESIA. It is now almost a universal practice to produce general anaesthesia by the combined action of a non-volatile narcotic with a volatile or gaseous anaesthetic. The former drug, termed a basal narcotic, is used to render the patient unconscious before the administration of the anaesthetic. The advantages of this method include absence of apprehension by the patient and a decrease in unpleasant after-effects, such as nausea and vomiting. Paraldehyde, introduced in 1884, is used chiefly with children. It is administered in a 10 p.c. solution in water and run slowly into the rectum at blood heat.

Avertin (tribromethyl alcohol), first used in 1926, is given in the same manner, the strength of the solution being 2½ p.c. Other basal narcotics include pernocton, amytal, nembutal, evipan, and pentothal (the last being most frequently used), and are usually given intravenously.

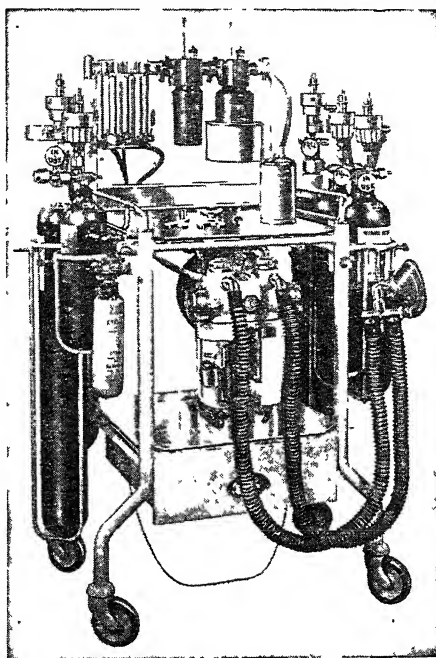
PROPERTIES. Nitrous oxide, N_2O ("laughing gas"), is the only inorganic gas capable of being used as an anaesthetic agent. Inhaled undiluted, it causes rapid but light anaesthesia and may be employed for short operations such as extraction of teeth. Longer periods of anaesthesia may be obtained by using a mixture of nitrous oxide with oxygen or air. With oxygen the gas is given by means of a special apparatus, such as the Boyle flowmeter machine.

Ether is a readily volatile liquid, and is largely used at the present time, especially in combination with nitrous oxide and oxygen. It may be given by the "open drop" method or by means of an inhaler. In the former method ether is dropped at a suitable rate upon a gauze mask held close over the nose and mouth, the face and eyes being protected by a pad of cotton wool.

Chloroform, like ether, is usually given by the open method. It is, however, rarely given alone, but is sometimes added to nitrous oxide and oxygen. It is a powerful anaesthetic, but because of its toxicity it is associated with risk to the patient.

In certain operations, e.g. on the head and neck, the method of endotracheal anaesthesia may be used, the anaesthetic being delivered to the lungs by a tube passed through the nose or mouth into the trachea.

Of the more recently introduced anaesthetics, ethylene, acetylene, and cyclopropane are gases, and can be used in the same way as nitrous oxide. Ethylene is an unsaturated hydrocarbon of the olefin series, with a slightly sweet taste and a rather pleasant smell. It is used to a certain extent in America but not at all in Great Britain. Acetylene is a colourless explosive gas with a faint ethereal odour when pure. It has been extensively used in Germany under the name of narycylen, in combination with oxygen. Cyclopropane, or trimethylene, was first prepared in 1882 by Freund,



Anaesthesia. Boyle's gas anaesthetic apparatus with Coxeter-Mushin carbon dioxide absorber
A. Charles King, Ltd.

and is now extensively used. It is a colourless gas, heavier than air, with a characteristic odour. It is administered by means of a closed-circuit apparatus which allows the gas to be re-breathed over and over again. Trichlorethylene (CCl_2CHCl) is a colourless, sweet-smelling, volatile liquid. The drug is now increasingly used as an anaesthetic in Great Britain.

THE SECOND GREAT WAR. Anaesthetics played an important part in the Second Great War, as in the First, by permitting the performance of essential operations that saved many lives and limbs. Experience gained during air raids and under Service conditions has once again emphasised the sensitiveness to anaesthetics of badly shocked patients. Experience gained after Pearl Harbour, however, emphasised the value of ether, given by the open drop method, notwithstanding the variety and severity of casualties. Many anaesthetists prefer to use nitrous oxide and oxygen, and to add cyclopropane instead of ether to deepen the anaesthesia. In circumstances in which inhalation methods cannot be used, the intravenous barbiturates, such as pentothal sodium, are most successful.

Fatalities due entirely to the employment of overdoses of

anaesthetics are extremely rare. In spite of the enormous number of persons anaesthetised every year, the number of deaths reported to the coroner is exceedingly small. In many instances it may be most difficult to determine the cause of death, as factors such as the state of health of the patient, the severity of the injury, or the gravity of the operation have to be taken into account and are often of more importance in the causation of death than the administration of the anaesthetic itself.

Bibliography. Theory and Practice of Anaesthesia, M. D. Nosworthy, 1935; Triumph over Pain, R. Fulop-Miller, 1938; Pharmacological Basis of Therapeutics, Goodman and Gilman, 1941; Recent Advances in Anaesthesia and Analgesia, C. L. Hewer, 1944.

Anagni. Town of Italy in Frosinone prov. It stands on a hill 1,500 ft. above sea level, and is 46 m. by rly. E.S.E. of Rome. The chief city of the ancient Hernici and a bishopric since 487, it possesses an 11th century cathedral, an early 12th century town hall, and remains of ancient walls. It was the birthplace of four popes and the scene of Adrian IV's death. During the Allied advance through central Italy in the Second Great War the town was liberated from German occupation by troops of the British 8th army on June 3, 1944.

Anagram (Greek *ana*, back; *gramma*, anything written). Word, phrase, or sentence made up of all the letters forming another word, phrase, or sentence, as in the instances: Matrimony, "Into my arm"; Florence Nightingale, "Flit on, cheering angel." An old scholastic example is that of Pilate's question *Quid est veritas?* (What is truth?), turned into *Est vir qui adest* (It is the man before you). The anagram has been used by several authors in devising pseudonyms, notably by François Rabelais, who turned the letters of his name into "Alcoffibras Nasier." In modern times the device has become familiar through its regular use in "cryptic" clues to cross-word puzzles.

Anaheim. City of California, U.S.A., in Orange Co., 25 m. by rly. S.E. of Los Angeles. It lies in a fruit-growing plain irrigated from the Santa Ana river. The earliest S. Californian settlement, due to cooperative purchase by some Germans in 1857, it was incorporated 1870 and chartered 1888. Pop. 11 031.

Anahuac. Name by which the great central plateau of Mexico is known, formerly applied to the ancient kingdom of Mexico. The region extends between the Rio Grande in the N. and the isthmus of Tehuantepec in the S., and was extensively covered by lakes, hence its name, meaning amid the waters.

Anaitis. Iranian goddess, sometimes called the Persian Artemis. The name is the Greek form of the Persian Anahita. The goddess of fertilising waters, she passed into Mazdeism, and was described in the Avesta. She was invoked in aid of marriage and childbirth, and the Persian Artaxerxes Mnemon erected images of her throughout his empire. Her cult spread to Armenia and Asia Minor.

Anakapalle. Town of Madras, India. It is 18 m. S.W. of Vizagapatam, on the rly. to Rajahmundry, has a trade in agriculture, and exports sugar, cotton, etc. Pop. 20,360, mostly Hindus.

Anakie. Mining village in Springsure district, Queensland, Australia, 193 m. W. of Rockhampton, on the rly. to Longreach. The very small population is interested in the mining and cutting of sapphires and the mining of corundum, valued as an abrasive.

Anakim OR **ANAKIMS.** Giant race who inhabited the hill country of Hebron, S. Canaan. They were overthrown by Joshua and Caleb (Num. 13; Josh. 11, 14, 15; Judg. 1). They are regarded as Cushite wanderers from Babel.

Analcime OR **ANALCITE** (Greek *an-*, not; *alkē*, strength). Hydrous metasilicate of sodium and aluminium. It usually occurs in well-formed colourless or white crystals of regular growth belonging to the cubic system. It is commonly a secondary mineral, a member of the zeolite group, and occurs like other zeolites filling amygdaloidal cavities in basalt lavas, such as those of the Faroe Islands, Antrim, the West of Scotland, Iceland, and Greenland. As an original constituent of igneous rocks, it is the latest product of consolidation in certain basalts (analcime-basalts and teschenites) and in the monchiquites (*q.v.*).

Analgesia (Gr. *an-*, not; *algēsia*, feeling of pain). Medical term denoting specifically loss of sensibility to pain without loss of the sense of touch. Analgia is a variant.

Analogy (Gr. *ana*, up to; *logos*, proportion). A certain similarity in things in other respects unlike. In language, it creates forms and even alters whole words after the model of others already familiar. Biological analogy is resemblance in function, not in form. In logic,

it is a process of reasoning in which it is assumed that if two or more things possess similar essential, non-contingent attributes, their other attributes will probably be similar. This method of reasoning is an incomplete induction, and its degree of certainty will vary with the number and importance of the similar attributes.

In theology, the argument from analogy is mainly of use for apologetic or evidential purposes. Proof of the existence of God, or of the truth of any particular religious doctrine or system of doctrines, cannot be demonstrated mathematically. The most that can be reached is a degree of probability that amounts to a moral certainty, and not only justifies but reasonably demands acceptance of a doctrine or compliance with a precept.

In the department of nature, where we have the evidence of sight and of the other senses, what we are in the habit of regarding as certainties often only amount to overwhelming probabilities. The world has seen the sun rise every morning throughout its history, and it is convinced that it will rise again to-morrow morning as usual. Such a conviction is justified by experience, but it does not amount to absolute certainty.

So in the realm of spiritual things, where the direct evidences of the senses are not available, where experience is less than universal and uniform, and where we deal with matters which belong to a plane only partly within our knowledge, it is vain to seek demonstrative proof. We can only find such a degree of probability as will exclude reasonable doubt, and afford a sufficient ground for belief and practice; and in the establishment of such a degree of probability, analogy plays a large and important part.

Analogy of Religion, THE. A treatise on the philosophy of religion, by Joseph Butler, bishop of Durham. It was published in 1736 with the title of *The Analogy of Religion, both Natural and Revealed, to the Constitution and Course of Nature*. It was based on the statement of Origen: "He who believes the Scriptures to have proceeded from Him who is the author of Nature may well expect to find the same difficulties in it as are found in the constitution of Nature." A whole literature of exposition and comment has grown up around *The Analogy of Religion*. See Butler, Joseph; consult also *Studies Subsidiary to the Works of Bishop Butler*, W. E. Gladstone, 1896.

Analysis (Gr., decomposition). Separation of any whole into the parts of which it consists. Its correlative is synthesis (putting together), without which it is incomplete. Thus, to obtain the true conception of a tree, it is necessary to consider separately its trunk, branches, leaves, etc., and then to put them together to form a whole. Grammatical analysis is the formal splitting of a sentence into its functional components, *i.e.* subject, predicate, object, etc.

Analysis. In chemistry, term implying the determination of the composition of a substance, or the quantity of extraneous matter present. If only the elements present are identified, the analysis is said to be qualitative, but if the quantities are determined, the process is termed quantitative. In the case of quantitative analysis, this is either gravimetric or volumetric, according as the components are weighed or measured.

Analysis is applied to a great variety of substances, but it is well to recognize that many important vegetable compounds are not amenable to accurate chemical analysis. Students are taught to analyse mixtures of chemicals by observing the physical characters of the compound and carrying out in a definite order a series of tests. In the case of the analysis of food, the analyst applies tests to ascertain whether it conforms to certain well-defined characteristics which experience has taught to be those of a pure article. See Chemistry.

Analysis. In mathematics, term employed to denote the process by which a problem is reduced to its simplest elements. It is more specifically applied to those branches of mathematics which investigate the relations of variable or indeterminate quantities by means of symbols. Thus analytical geometry investigates the character of lines, curves, and surfaces, by the employment of algebraic symbols. The process is carried farther in some branches of the infinitesimal calculus. Harmonic analysis is a mathematical method by which irregular agglomerations of quantities can be reduced to forms in which they show themselves amenable to grouping. Thus harmonic analysis applied to a vast number of statistics, such as statistics of rainfall, is used in attempts to discover a law governing the figures.

Analysis. In music, term used for the species of study concerned with the details of the construction of a composition. Such are its phrase building, its

harmonic or contrapuntal texture, its broader design, and the relationship of section to section.

Analyst, Public. Person appointed by a local authority—county or town council in Great Britain—under the provisions of the Food and Drugs Act, 1938. Public analysts have to possess "competent knowledge, skill, and experience as analysts of all articles of food and drugs." The appointment, terms of appointment, and removal of public analysts require the approval of the ministry of Health. Where there is only one public analyst a deputy may be appointed. Every person appointed as a public analyst must either already hold such an appointment or hold the diploma of the Fellowship or Associateship of the Royal Institute of Chemistry and a certificate from the Institute after an examination in the chemistry (including microscopy) of food, drugs, and water. The ministry of Health may approve other qualifications. A deputy public analyst must be similarly qualified.

It is especially provided in the Food and Drugs Act that the analyst must not be engaged directly or indirectly in any trade or business connected with the sale of food or drugs in the place for which he is appointed. It is usual to pay a fixed annual salary or retaining fee to an analyst and a separate fee for each analysis made, the terms varying with different public authorities.

Any private individual who has purchased a food or drug is entitled to submit it to the public analyst for the place where the purchase is made, and to receive a certificate of the result of his analysis, on payment in advance of a fee not exceeding £1 15s. Private individuals who take samples for analysis, or officials entrusted with that duty by local authorities, are required, after completing the purchase, to observe strictly the formalities of dividing the sample into three parts, sealing them up, and leaving one part with the seller if required to do so. The form in which the analyst's certificate must be made out is prescribed by the ministry of Health, and this certificate is accepted as evidence where prosecutions result. In case of dispute the reserve samples are submitted to the Government before the case is decided. The public analyst may be called to give evidence as to his analysis, and he is required by law to make quarterly

reports of the number of articles analysed by him. The report is made to the local authority.

The Society of Public and Other Analysts, founded in 1874 as the Society of Analysts, was incorporated as a limited company under its present name in 1907. Originally concerned only with the efficiency of food adulteration laws and improvements in the methods of detecting adulterations, its researches are now extended to deal with the inorganic side of analytical chemistry. The society publishes a monthly journal, *The Analyst*. The offices are at 7-8, Idol Lane, London, E.C.3.

Anamalai Hills OR **ELEPHANT HILLS**. Mt. range in Travancore, S. India. Part of the W. Ghats, these hills form a great tableland from 2,000 ft. to 8,000 ft. high and contain Anamudi (elephant forehead), 8,850 ft., the highest peak in S. India. An important station in the forest service, Mount Stuart, is situated in the midst of a dense bamboo jungle. The elephant, bison, and ibex abound, elephants being caught in pits and tamed; on the lower hills teak, tea, and coffee are grown.

Anamalai University. Founded 1928, at Anamalinagar, in the Madras presidency (now a prov.), it was formed from the Sri Minakshi college for higher instruction in English, the Sri Minakshi Tamil college, and the Sri Minakshi Sanskrit college, all long maintained by Rajah Sir S. R. M. Anamalai Chettiar of Chettinad. The government of Madras added to the endowment a sum equivalent to that given by the rajah.

Ananda MAHDOL (1925-46). King of Siam (Thailand). Born Sept. 20, 1925, he ascended the throne as constitutional monarch on March 2, 1935, on the abdication of his uncle Prajadhipok. He was at school at Lausanne, Switzerland, at the time, returning there after his coronation in 1938. A council of regency governed in his name (1941-45, under the control of the Japanese). On June 10, 1946, he was found dead in his Bangkok palace, and later it was officially announced that he was the victim of either suicide or assassination.

Ananias. The name of three persons mentioned in the Acts of the Apostles. (1). A convert who made a false declaration concerning the sale of a piece of land for the church; he and his wife Sapphira fell dead before the rebuke of Peter (Acts 5). (2) A disciple at Damascus to whom

Christ appeared in a vision and directed him to baptize Saul of Tarsus, who was afterwards known as Paul (Acts 9 and 22). (3) The Jewish high priest who was one of Paul's accusers before Felix (Acts 23-24). The first-named is the one most often referred to, his name having become a synonym for liar.

Ananiev. Town of Ukraine S.S.R., in the Moldavia A.S.S.R. It stands on the Tiligul, 95 m. N. of Odessa, and its chief industry is connected with agricultural produce. Pop. 20,000.

Anapaest (Greek *ana*, back; *paiein*, to strike). In prosody, a trisyllabic foot consisting of a long, or accented, syllable preceded by two short, or unaccented, syllables. It is so called because it is a dactyl reversed. Although the English language contains few words that are anapaests—domineer is an example—anapaestic verse, especially the anapaestic tetrameter, has established itself firmly in English literature. William Walsh (1663-1708) was one of the first to use the form, of which most effective use has been made by many poets, notably by Swinburne. An example of this measure is to be found in Wordsworth's poem beginning: At the corner of Wood Street when daylight appears. See Poetry.

Anaphylaxis (Gr. *ana*, back; *phylassein*, to guard). Medical term applied to the condition of exaggerated susceptibility, or sensitisation, to the action of an injected (albuminous) substance following a first injection of the same substance. The effect has been observed following antitoxin injections including blood serum. If the injections are given daily or weekly no sensitisation occurs, but an interval of 12 to 14 days between injections may result in anaphylactic shock, a dangerous condition in some cases. It is avoided by desensitising the patient by injecting a small dose of serum subcutaneously some hours before the antitoxin serum. It is thought to be due to the reaction of a protein foreign to the human organism. See Allergy.

Anarchism (Gr. *an-*, not; *archē*, rule). Revolutionary doctrine in opposition to all law and order as enforced by a government. In its original sense the Greek word anarchy meant no government whatever, and it is so used today.

Anarchism, however, is held by its more intelligent advocates to be a system of voluntary government not relying on the sanctions

of the state. It is rather a movement directed towards destroying the tyranny of the state and giving fuller play to natural economic forces and the principle of mutual aid. This, it is thought, would produce a state of society in which social order would rest not on repression, but on goodwill. In this sense anarchism is the antithesis of socialism, which implies more rigorous government. This line of thought owes much to the French thinker Proudhon and the Russian Bakunin, and was developed by Prince Kropotkin. Anarchism and socialism are in agreement that land and capital are to pass from private ownership. History gives no support to the theory of anarchism, except possibly for a small community. Although the philosophy of anarchism is not concerned with violence, its supporters generally are avowed advocates of forcible methods and of propaganda by deed. Before the First Great War anarchist societies were common in Europe, especially in Russia and Spain, and also in the U.S.A., while the trade unions of Italy and France were anarchist rather than socialist. After the war, up to and during the Spanish civil war of 1936-39, the anarchist organization in Catalonia, the *Federación Anarquista Ibera*, was a power in Spanish political life on the extreme republican side. In Spain and elsewhere anarchism has shown marked affinity with Syndicalism (*q.v.*). Small anarchist groups have existed in England since 1885. *Consult* Anarchy, P. A. Kropotkin, Eng. trans. 1897.

Anastasius. Name of four popes. Anastasius I, pope 398-401, is chiefly remembered for his condemnation of certain points in the teaching of Origen. He was canonised and his feast is kept on April 27. Anastasius II, pope 496-8, sought in vain to reconcile the Eastern and Western churches. Both Anastasius III, 911-13, and

Anastasius IV, 1153-4, were undistinguished.

Anastasius I (c. 430-518). East Roman emperor. Born at Dyrachium of humble parentage, he became a palace usher and in 491 succeeded Zeno, whose widow Ariadne he married, as emperor, changing his name from Silentiarius to Anastasius. In 493



Anastasius I. This ivory diptych commemorates the consulship of Anastasius, a court official who was later appointed successor to the emperor Zeno, and ruled the Eastern empire with conspicuous success

British Museum (cast)

he defeated Zeno's brother Longinus at Cotyaeum (Kutaya), and in 506, after a three years' war, made peace with Persia. In 512 he built the long wall, called after him the Anastasian wall, to protect Constantinople from Bulgar and Slav raids.

Anastasius II (d. 721). East Roman emperor, originally named Artemius. He was secretary to the emperor Philipppicus Bardanes, whom he succeeded in 713. A mutiny at Rhodes in 716 resulted in his deposition in favour of a tax-gatherer, Theodosius, who was succeeded by Anastasius's former general, Leo the Isaurian. In 721 Anastasius, who had lived

for five years as a monk at Thessalonica, besieged Constantinople, but was captured by Leo and put to death.

Anastigmat. Lens for photography free from the defect of astigmatism (*q.v.*). Anastigmats, first introduced in 1892, yield photographs of great sharpness, utilise a great amount of light, and cover a relatively large plate. In these respects they proved to be superior to any previous type of lens. *See* Photography.

Anastomosis (Greek, mouth opening). In anatomy, the union or communication of blood vessels in the form of a fine network. The term is also applied to operations in which nerves or the bowel are joined up. Arterial anastomosis is of practical importance because if one artery is blocked, either by injury or by a ligature, its branches can be supplied with blood through those of another artery.

Anatase (Gr. *ana*, back : *temnēn*, to stretch). Oxide of titanium. It is of the same composition as rutile and brookite, but differs from them in crystalline form. It occurs as small tetragonal pyramids and tables, and as brilliant crystals, like diamonds, from Brazil. In the form of microscopic crystals it is of common occurrence among the heavier constituents of most sands and sandstones.

Anathema. Greek word used in the Church in passing sentence of excommunication. Its literal meaning is "something set up," and it was originally applied to gifts to the gods or to animals designated for sacrifice. In the latter connexion it gained its later meaning of condemned to destruction, and it is in this sense that S. Paul uses the term : "If any man love not the Lord Jesus Christ, let him be anathema" (1 Cor. 16).

Anatolia. The late Greek name (Anatolē, the East) for Asia Minor (*q.v.*). It was revived by the Turks, who called it Anadoli.

Anatolian Railway. Railway in Asiatic Turkey. Beginning on the outskirts of Uskudar (Scutari), on the Bosphorus opposite Istanbul, it traverses the whole of Asia Minor. The first portion to Izmit, along the shore of the Sea of Marmara, was opened in 1872. In 1889 building to Eskişehir commenced, and largely at the persuasion of the German emperor the line was soon extended E. to Angora (now Ankara) and S.E. to Konieh, the branches being opened respectively in 1892 and 1896. From Afyon Karahissar on the S.E. branch, connexion was

secured with the Izmir group of rlys. by means of a line to Alashehr. In 1902 the Turkish government gave powers to what was practically the Anatolian Railway, otherwise the Deutsche Bank, to construct a line from Konieh through Adana to Iraq and the Persian Gulf.

Anatomist, THE. Play by James Bridie. Produced on Oct. 7.

ANATOMY: STUDY OF BODY STRUCTURE

Sir Arthur Keith, F.R.S., Author *The Engines of the Human Body*

In this article is given an account of what the science of anatomy is, and of the branches into which it is divisible. Its information should be supplemented by reference to articles on such special subjects as Embryology; Osteology; Morphology; Surgery; etc.

Derived from the Greek *anatemnein*, to cut up, the word anatomy is applied to the scientific study of the bodily structure of man and other animals. It has also been described as the art or practice of dissection, as it is only by dissecting the body that the necessary knowledge about the structure of its parts is obtained.

Study in the Dissecting Room

Every medical student, when he enters the dissecting room to study the structure or anatomy of the human body, carries with him two things essential for his outfit—a dissecting case containing a knife, forceps or pinchers, scissors, and hooks, and a dissecting manual or text-book of practical anatomy, to guide him in exposing, recognizing, and separating the various structures, organs, and tissues which make up the human body. In the dissecting room he finds a demonstrator of anatomy to assist him in the difficulties which he is certain to encounter, while in the neighbouring lecture theatre a professor of anatomy explains to him the parts of the body, according to the systems in which the parts are built up, i.e. according to systematic anatomy.

The systems of the body are (1) the alimentary system or the parts and organs which have to do with the mastication, transmission, digestion, and absorption of food; (2) the absorbent or lymphatic system, which is concerned in conveying to the blood certain products absorbed from the alimentary system and also waste products from the tissues which compose every part of the living body; (3) the respiratory system, comprising the lungs and breath passages, by which oxygen enters the body and the waste gas—carbon dioxide—is thrown out; (4) the circulatory system, made up of a muscular pump—the heart—which forces blood containing oxygen and the nutrient needed

1931, on the opening of the Westminster Theatre, where it ran for 127 performances, it portrayed the sinister Dr. Knox, the Edinburgh surgeon who lived at the beginning of the 19th century. Knox was supplied by the professional murderers Burke and Hare (*q.v.*) with corpses which he used for surgical dissection. The part was played by Henry Ainley.

by living tissues along arteries into a system of minute vessels or capillaries, from which the living tissues are fed; while from the capillaries the blood, laden with waste products from the tissues, particularly carbon dioxide, passes into veins, by which it is conveyed back to the heart, (5) the locomotive system, comprising the numerous muscles of the limbs, trunk, and face, which give living beings a power of moving one part upon another; the bones or skeleton, which serve as levers to the muscles and give support, solidity, and protection to the body; and the joints, where bones come in contact and move on each other. Muscles are yoked to the bones by tendons or sinews; ligaments are the fibrous bands which unite bones and surround joints; cartilage or gristle is the substance or tissue which covers the rubbing or articulating ends of bones or, as in the front part of the chest, may actually replace bone, where flexibility in place of rigidity is needed; (6) the nervous system, which comprises the brain, spinal cord, nerves, and organs of sense, such as the eye, the ear, the nose, the tongue, and the palate. In this system must also be included the skin, which not only serves as an organ of sense, but also protects the body and helps in regulating its temperature.

Practical and Systematic Anatomy

When the student leaves the dissecting room and lecture theatre and proceeds to the wards and operating theatre of the hospital, he applies his knowledge of practical and systematic anatomy to the recognition and treatment of diseased conditions. He studies the anatomy of the human body in order to be able to assist in preventing a breakdown or repairing a defect.

Besides human anatomy, there is another applied branch, veterinary anatomy; this includes a

knowledge of the structure of domestic animals, such as that of the horse, ox, and dog, and has to be mastered by all students of veterinary medicine. Artistic anatomy is another branch of knowledge, in which the structure of the human or animal body is studied in order that the artist may rightly interpret and delineate the external form of the living body in its various postures. (*See Drawing.*)

No doubt physicians were the first to study anatomy, but in the 4th century B.C. inquiring men like Aristotle found it necessary to dissect animals and study the plans on which their structures were arranged before it was possible to discover the affinity of one kind of animal to another. Hence began that great branch of knowledge known as comparative anatomy, but it was not until the close of the 18th century that it was rightly cultivated. At that time naturalists, stimulated by the example of the French anatomist Cuvier, set out to classify all living animals into groups, not according to their external appearance, but in accordance with their internal structure or anatomy. Then, in the middle of the 19th century, appeared Charles Darwin, who explained by his theory of evolution why certain animal groups should show varying degrees of community of structure because they are related in a varying degree by descent.

Founder of Functional Anatomy

Before Cuvier's time John Hunter, the greatest anatomist that Britain has produced, dissected animals, not to classify them, but to understand the mechanism of their bodies. He is the real founder of what is known as functional anatomy. Morphology is the study of the architecture of the animal body; it is the opposite of functional anatomy, for in this study no reference is made to function, only to form. The study of comparative anatomy showed that the discovery of a single bone was sufficient to give a clue to the kind of animal of which it had formed a part. Hence it became possible to reconstruct from fossilised bones the complete form of an animal which had lived on the earth or in the sea many millions of years ago. The study and reconstruction of extinct animals form that branch of knowledge named palaeontology.

Two other branches of anatomy remain to be mentioned, both of them of recent growth. One is microscopic anatomy and the other embryology—or the study of the structure and growth or developing of foetal forms of animals. The

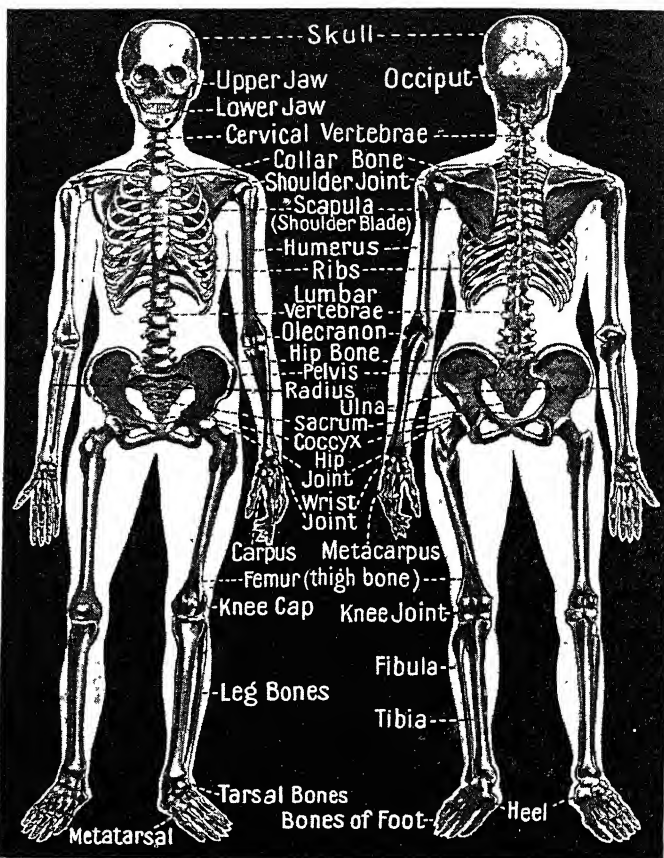
present state of microscopic anatomy is the result of a century of endeavour and experiment. We have learned to treat soft tissues of animal bodies with chemicals so that they become fixed and solid, and how to permeate small parts of such tissues with a solid substance so that they can be cut into slices of the utmost thinness. Instruments called microtomes have been invented to shave off slice after slice of uniform tenuity; dyes have been discovered which pick out each element by a distinctive colouring; microscopes have been improved so that any degree of magnification of the cells or elements which compose the tissues can be obtained; methods have been devised of modelling in wax a magnification of each microscopic section of the part cut, and thus, by adjusting and fixing the wax magnifications together, a reconstruction on an enlarged scale can be obtained of minute organs or of small parts of great organs. In the same way the minute, soft gelatinous embryo can be exactly reproduced as an enlarged wax model. The method is laborious, but the results yielded are final.

Artistic anatomy is the study by painters, sculptors, etc., of the superficial aspects of the body, human or animal. Study is usually confined to the skeleton and the appearance of surface muscles in repose or action.

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Anatomy of Melancholy, THE. Literary work by Robert Burton. It was first published in 1621 as *The Anatomy of Melancholy. What it is. With all the Kinds, Causes, Symptoms, Prognostics, and several Cures of it. In Three Main Partitions, with their Several Sections, Members and Sub-Sections.* Philosophically, Medicinally, Historically opened and cut up. By Democritus Junior. The characteristic fullness and verbal richness of the work, which embodies quotations from authors of all ages, reflects Burton's unique individuality. There were seven further editions before the close of the 17th century, and many good modern editions have been published.

Anau. Delta-oasis near Ashkabad, in Turkmen S.S.R. Two prehistoric kurgans or tumuli were excavated by H. Schmidt, 1904,



Anatomy. Front and back views of skeleton, with the terms used in anatomy for indicating the various bones that build up the human frame

for the Pumpelly expedition of the Carnegie Institution, Washington. The N. kurgan yielded animal remains and hand-made pottery, allied to the Neolithic levels in Elam and elsewhere, and passing into the Copper Age. Metal-using was more fully developed in the S. kurgan, where terra-cotta votive figurines and wheel-made pottery suggest Sumerian contact. The lower strata revealed cultivated wheat and barley, and wild animals, succeeded by the domesticated ox, pig, horse, and sheep; the upper strata added the goat, dog, and camel. *See* Domestication.

Anaxagoras (c. 500–423 B.C.). Greek philosopher. Born at Clazomenae in Asia Minor, he settled at Athens, where he found an influential patron in Pericles. Whereas older philosophers had endeavoured to reduce the material universe to one element, such as fire or water, Anaxagoras held that the universe was composed of an infinite number of seeds of the different kinds of matter. In the beginning these seeds were in a

state of chaos, but with the advent of *nous*, or intelligence, a rotatory impulse was given to the mass, as a result of which all cognate seeds gradually came together to form the different substances.

His speculations brought Anaxagoras into conflict with the forces of orthodoxy at Athens. His suggestion that the sun and moon were not divinities, but merely fiery lumps, was condemned as atheistic, and he was forced to leave the city. He died at Lampsacus in Asia Minor.

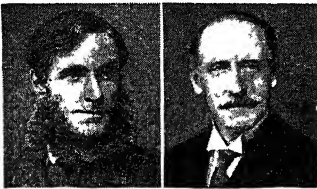
Anaximander (c. 610–547 B.C.). Greek philosopher. Born at Miletus in Asia Minor, he was the friend of Thales and lived for many years at the court of Polycrates of Samos. He held that all the material substances which make the universe are derived from one element—which he called *apeiron*, or indeterminate matter—which contained and governed all things, being itself immortal and imperishable. He is also credited with various inventions, e.g. a sundial and celestial globe.

Anaximenes. A Greek philosopher who flourished in the 6th century B.C. Born at Miletus in Asia Minor, he held that all the substances of which the material universe is composed are derived from one natural element, air, as the result of its rarefaction and condensation.

Anbury. Name of a parasitic turnip disease. *See* Club-root.

Ancash. Coastal department of Peru. It is S. of Libertad and N. of Lima and extends E. to the Marañon river. It is governed by a prefect, responsible to the Peruvian supreme court of justice. Mainly mountainous, it is rich in minerals, including gold, silver, copper, lead, tin, and antimony, and grows cereals in its irrigated valleys. Area, 14,700 sq. m. Pop. 424,975. Capital, Huaraz.

Ancaster, DUKE and EARL OF. English titles, that of Duke of Ancaster and Kesteven being held



First Earl of Ancaster Second Earl of Ancaster

by the family of Bertie 1715-1809, and that of earl of Ancaster by the family of Heathcote-Drummond-Willoughby since 1892. Robert Bertie (1660-1723), 4th earl of Lindsey, was made a marquess and then duke of Ancaster, and the title was held by his descendants until the 5th duke died in 1809. He also held the old barony of Willoughby de Eresby, and in 1871 this was revived in favour of the widow of Lord Aveland, that lady being descended from the Berties. Her son and successor, Gilbert H. Heathcote-Drummond-Willoughby, was made earl of Ancaster in 1892, his son Gilbert (b. 1867) succeeding him in 1910. The earl is joint hereditary great chamberlain of England, an office held by the dukes of Ancaster.

Ancestor-worship. Expression in ritual of reverence for departed ancestors, parental or remote. It should be distinguished from the general cult or tendence of the dead, which is a widespread concomitant of animism. This cruder cult, traceable to prehistoric Europe, has profoundly affected the methods adopted by mankind for the disposal of the dead. It was designed to keep the ghost away, and much so-called ancestor-worship is no more than this, in-

volving no idea of propitiation. Cooked rice and coconut milk are offered by the Veddas to the spirits of the recently deceased; in the Solomon Islands miniature huts are built for ancestral skulls. Death cults of this order are observed by half the human race.

In its stricter form ancestor-worship belongs to a later culture, when settled husbandry and patriarchal rule first developed outstanding men. It is this aspect of it that makes the Bantu practice more advanced than that of the W. African negroes, who do not deify their ancestors. In this form, too, it dominated early Greek religion, with its deification of heroes. It persisted as a private worship in imperial Rome by the side of the national polytheism, and was converted, in early Christianity, to devotion to the saints. Its chief home to-day is China, where the motive is filial piety rather than the hope of objective benefits. *See* Animism.

Anchises. In Greek legend, ruler of Dardanus in the Troad. By his beauty he attracted the goddess Aphrodite, who became by him the mother of the Trojan hero Aeneas (q.v.). In the story in Virgil's Aeneid the aged Anchises was carried off by his son after the fall of Troy, and died in Sicily.

Anchor (Lat. *ancora*, a hook). Implement of iron or steel attached to a cable and thrown overboard to hold a ship stationary. A

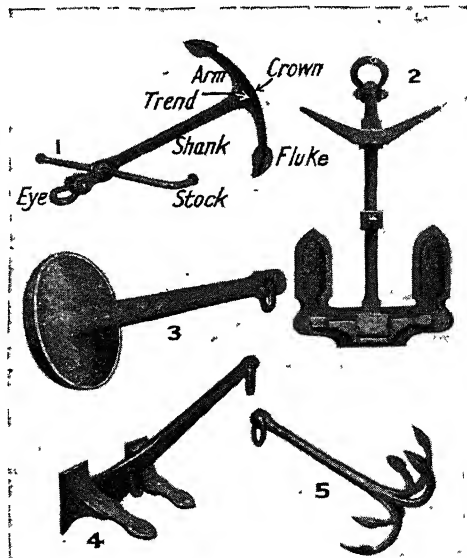
large ship will carry several anchors—bower, sheet, stream, waist, and spare anchors. The sheet anchor is presumed to be the best and to be used only in case of emergency. Hence the popular expression, "to be the sheet anchor of," meaning to be the mainstay of any person or thing. Modern ships' anchors are mostly stockless. Types of small anchors are the grapnel, which has several flukes, used for dragging, and in olden times employed for grappling ships, the kedg, and the killick. A sea anchor is made of wood and canvas and acts as a brake upon a ship. By "shoeing the anchor" is meant covering its flukes

with wood so as to make them hold better in soft ground.

Anchorage. Place where ships can lie safely at anchor; usually a bay or a sheltered roadstead. By anchorage is sometimes meant the dues which vessels have to pay for mooring in a haven.

Anchor Ice. Ice formed on the bed of a stream. The waters of a stream are mechanically mixed by continual movement, so that when the air temperature is very low the whole mass is occasionally reduced to freezing point. In these conditions anchor or ground ice would be formed on the bed, where there is less movement than at the surface. This ice usually clings to stones and other loose bodies. When an increase of temperature occurs, the ice rises to the surface and floats away, carrying with it the loose matter frozen into it. In the Baltic Sea ice formed in this manner has been known to raise even heavy iron chains and anchors. The phenomenon has been frequently observed in the Thames.

Anchorite (Greek, *anu*, back; *chorein*, to retire). One who retires from the world and lives apart for religious meditation. Anchorites arose about the 3rd century in Egypt, where at one time some thousands lived in the deserts. In later days the anchorite or anchoress usually occupied a cell or small house connected with a church. *See* Asceticism.

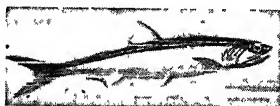


Anchors of different types: 1. Admiralty pattern. 2. Close stowing anchor. 3. Mushroom anchor, used for lightships. 4. Stockless anchor. Types 1, 2, and 4 are used in the Royal Navy. 5. Grapnel, used from small boats

Anchor Line. British steamship company. The first Anchor Line originated in a service established in 1852 between the Clyde and Portuguese and Spanish ports. Additional services began some years later between Glasgow and New York, and from Glasgow and Liverpool to Bombay and Calcutta. In Dec., 1911, a controlling interest in the Anchor Line was acquired by the Cunard Steamship Co., Ltd. In 1916 an agreement was concluded for a fusion of interests of the Anchor and Donaldson Lines in passenger and freight service between Glasgow and Canada. The original Anchor Line Company went into liquidation in 1935 and a completely new company, with new shareholders, Anchor Line (1935) Ltd., was formed. The date has since been dropped from the title.

Anchor Line vessels lost as a result of enemy action during the Second Great War included the *Caledonia* (renamed *Scotstoun*) and *Transylvania*, 17,000-ton vessels built in 1925. Both were sunk in 1940.

Anchovy (*Engraulis encrasi-cholus*). Small fish of the herring family. It is found in abundance in the Mediterranean. It occurs more or less around all the European coasts, except in the extreme north, and is not uncommon off Cornwall and Devonshire. It is characterised by a deeply forked



Anchovy, a small fish of the herring family, common in European waters

tail and a conical snout which projects considerably beyond the lower jaw. The anchovy in its preserved state is much in demand as a relish and for sauce-making.

Anchovy Pear (*Grias cauliflora*). Fruit produced in Jamaica and the W. Indies by a tall slender tree of the order *Lecythidiaceae*. The tree has an unbranched stem and a crown of drooping, lance-shaped, glossy leaves, often 3 ft. in length. The flowers are large and white with four leathery petals. The fruit is plum-like and russet-brown, 3 ins. or more long. It is pickled and tastes like the mango.

Anchusa. For these familiar flowers of garden and hedgerow see *Alkanet*.

Ancien Régime. Term used for the social and political system which was established in France before the French Revolution



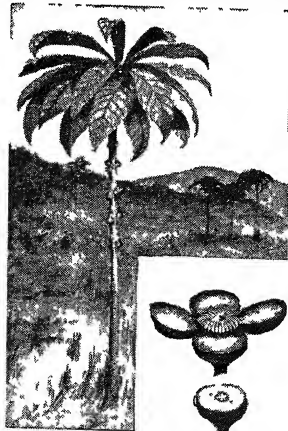
Ancient Mariner. An artist's grim rendering of the lines in Coleridge's great poem "Instead of the cross, the Albatross about my neck was hung". Painting by Percy W. Gibbs. By permission of the artist

It gained additional currency as the result of De Tocqueville's popular work, *L'Ancien Régime et la Révolution*, 1856.

Ancient (late Latin *antianus*, old). Word of various applications. Among special uses of it, ancient, as distinct from medieval or modern, history is concerned with the period before the fall of the

Western Roman Empire, A.D. 476. By the ancients is generally understood the civilized peoples of antiquity, and sometimes the early Greek and Roman authors. The word often implied seniority, hence influence and position. In the book of Isaiah the ancients of his people are the rulers. The final scene of Bernard Shaw's play *Back to Methuselah* introduces a superior class of humans known as ancients, who, extending their lives by hundreds of years, had acquired infinite wisdom. The senior members of the Inns of Court and Chancery were called ancients. The Ancient of Days is a title of God. As a corruption of ensign, the word formerly meant a flag or flag-bearer, cf. Shakespeare's *Ancient Pistol*.

Ancient Buildings, Society for the Protection of. Founded in 1877 by William Morris, its function is to secure the repair and maintenance of ancient buildings, including churches, castles, town walls and bridges, stone crosses, tithe barns, historic houses, and windmills. Its offices are at 55, Gt. Ormond St., London, W.C.1.



Anchovy pear, showing the curious inflorescence and a section of the fruit

Ancient Demesne (Lat. *dominium*). Term used in England for land which had long been in possession of the Crown and whose tenants were thus granted certain advantages, mainly in the direction of exemptions from public burdens. Medieval lawyers used it for manors mentioned in Domesday Book as owned by Edward the Confessor or William the Conqueror. It was held that the king could take a tallage, or toll, from his tenants in ancient demesne without consent of Parliament, and until 1852 actions about the ownership of such land followed a procedure somewhat different from that of cases affecting land of other kinds. See Land Laws.

Ancient Lights. English legal term. At common law, if a building had a window which had been there since time immemorial, the owner of the building had the right to an uninterrupted flow of light to that window, and it was called an ancient light. This meant that no adjoining owner might put up anything which would shut out a reasonable flow of light to the window. By the Prescription Act, 1832, a light is ancient if it has been uninterrupted for 20 years.

Ancient Mariner, THE RIME OF THE. Poem by S. T. Coleridge (*q.v.*). It is founded on a dream told him by a friend. Wordsworth and Coleridge discussed the theme during a country walk, Nov., 1797, and arranged to write the poem in collaboration, but the former contributed only about half a dozen lines. It was first published in their joint volume of anonymous Lyrical Ballads in 1798. The poem, in which the mariner relates his sufferings after the wanton killing of an albatross, is masterly as an example of lyrical narrative, and in its powerful suggestion of horror.

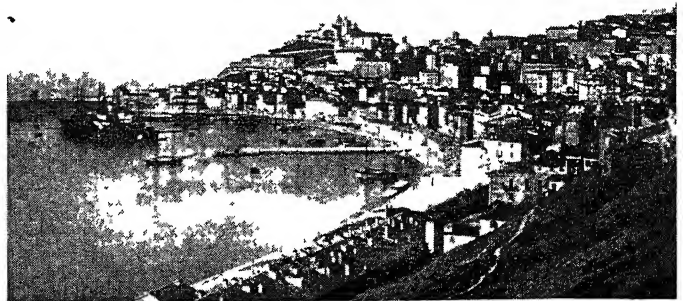
Ancient Monuments, PROTECTION OF. In Great Britain this movement has made much progress in recent decades, and public opinion is now alive to its desirability. Various royal commissions on ancient and historical monuments were entrusted with the task of compiling inventories of the monuments of each county in Great Britain. The Ancient Monuments Acts, 1910 and 1933, have empowered the Commissioners of Works, now the Ministry of Works, or a local authority, to purchase or take charge of buildings of historic or architectural interest. Apart from Crown property like the royal palaces and the Tower of London, the ministry

now has authority over two classes of buildings: (1) those which have been given to or purchased by the ministry or placed by owners under the ministry's guardianship, *e.g.* Stonehenge, Hadrian's wall, Rievaulx and Tintern abbeys, Pevensey castle, altogether about 300 in 1945; (2) "scheduled" buildings or monuments (including earthworks), the owners of which must give notice to the ministry if any alterations are contemplated, such alterations being liable to prevention by the ministry under a preservation order.

The Ancient Monuments Acts do not give the ministry any powers over ecclesiastical buildings in use or over inhabited houses, unless the latter be given or purchased by agreement. The ministry is, however, empowered to promote preservation schemes to protect not so much the monument as its amenities, restricting the use to be made of the im-

Ancona (Greek *ankon*, elbow, bend). Seaport and episc. city of Italy. The capital of Ancona province, it stands on the Adriatic, 130 m. direct and 185 m. by rly. N.E. of Rome. The harbour, one of the best in Italy, is protected by two fine piers, one built by Trajan in 115 and bearing a triumphal arch in his honour.

Ancona manufactures soft soap, ship's rigging, leather, and tobacco, and exports goat and lamb skins, hemp, coral, and asphalt. The city was founded about 385 B.C. by Greeks from Syracuse, became a Roman colony, and was made a naval station in the Illyrian war, 178 B.C. Caesar took it on his famous march north; Trajan enlarged it; Goths, Lombards, and Saracens sacked it; and in 1532 it was handed over to Pope Clement VII. It was captured by the Austrians in 1849 and bombarded by them from the sea during the First Great War. During the Second Great War,



Ancona Pre-war view of the Italian seaport, with Monte Guasco, crowned by the cathedral, in the background

mediate surroundings. Such a preservation scheme has been made in respect of the surroundings of Hadrian's wall. See also National Trust.

Ancon. Hospital quarter of Panama city, Central America. It stands on a hill near Panama city, and was founded during the construction of the Panama Canal. Its great hospital, with 1,600 beds, was built for the canal workers.

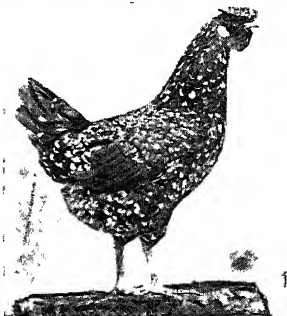
Ancon or Port Ancon. Coast town of Peru. It is 30 m. by rly. N.W. of Lima. It is less populous than formerly, although it is much visited for bathing. Lord Cochrane, leading the Chilean navy against the Spaniards in Peru, entered the harbour in 1820. A Chilean army landed here in 1838, and the Chileans bombarded the town in 1880. It gave its name to the peace that ended the war between Chile and Peru in 1883.

Ancona, occupied by German forces, was captured by Polish troops on July 18, 1944. Some 2,000 Germans were taken prisoner. The harbour was blocked by the Germans with sunken vessels. A lamentable loss to art resulted from the bombing and shelling. Among wrecked buildings was the cathedral dating from the 12th century, standing on the site of a temple of Venus, of which ten original columns survived. The museum and several historic churches and palaces were also destroyed. Pop. 89,198.

Ancona. Prov. of N.E. Italy, in the Marches. It slopes N.E. from the Apennines to the Adriatic, is mountainous in the S.W., level in the N.E., and has an area of 748 sq. m. Fruit and cereals are produced, silkworms are bred, sulphur is mined, and paper, sugar, and bricks are manufactured.

The coast towns are served by the Brindisi Rly. The March of Ancona (Marca d'Ancona) was one of the old divisions of central Italy. It formed part of the Papal States annexed by Victor Emmanuel in 1860.

Ancona Fowl. Offshoot of the Leghorn breed. It was imported into Great Britain in the 19th



Ancona Fowl. Rosecomb pullet, prize-winning specimen

century. The breed is very precocious, the pullets often laying at eighteen weeks old, and their eggs are large and white-shelled. As a table bird, however, it has few qualifications. Like all active breeds, it is a great forager, and is thus suited to the farmer who has plenty of space. The general colouring of the plumage is a beetle green, each feather being tipped with white. The legs are yellow mottled with black or brown, the face is bright red, and the earlobes are white. See Poultry.

Ancre. River of N. France. Rising a few miles S.W. of Bapaume, in the department of Pas-de-Calais, it flows generally W. and S.W. for about 25 m. and joins the Somme below Albert. In addition to Albert, Thiepval, Grandcourt, and Miraumont, all prominent in the First Great War, lie on or near its banks.

Ancre, BATTLES OF THE. Series of British attacks in the First Great War, Nov., 1916—March, 1917. They resulted in the first important surrender of territory by the Germans in the west. General Joffre, to relieve the pressure on Rumania, had been anxious to maintain the attack on the Somme, and in the autumn of 1916 Sir D. Haig determined to assault the Ancre salient. This consisted of the German-held fortified villages of Beaumont-Hamel, Grandcourt, Beaucourt, and St. Pierre Divion. Haig employed General Gough's 5th army, one division to attack the German works S. of the Ancre

river. The German force in the salient numbered seven divisions. Tangles of trenches with concrete machine-gun posts and barbed wire of extraordinary thickness and depth covered the countryside. The ground across which the British were to advance was of great difficulty, a shell-ploughed waste, full of quagmires and craters: and the bombardment, though necessary for the purpose of cutting the wire, tore up the soil and deepened the mud.

On Nov. 13 at 5.42 a.m. the British left their trenches for the advance. To the W. the attack was delivered from a point N. of Serre as far as the Ancre, on a front of 5,000 yards, the artillery covering the advance with a creeping barrage. At Serre the attack was repulsed with heavy loss. Troops of the 31st division, after penetrating two German lines, had to be withdrawn at night as they could not be supported.

The 3rd division, S. of the 31st, struck the terrific works N. of Beaumont-Hamel, found the wire an almost insuperable obstacle, and met a fearful fire. The 2nd division could not make progress because of the defeat of the attack farther N., which left its flank exposed. The 51st (Highland) division succeeded, however, in capturing Beaumont-Hamel with 1,500 prisoners after savage fighting, while the 63rd (Naval) division pushed to the outskirts of Beaucourt, though its centre was held back by a formidable German redoubt until next morning, when a tank arrived and the Germans immediately surrendered. Through the fine leadership and personal gallantry of Lt.-Col. Freyberg, V.C. (g.v.), Beaucourt was stormed on the morning of Nov. 14. South

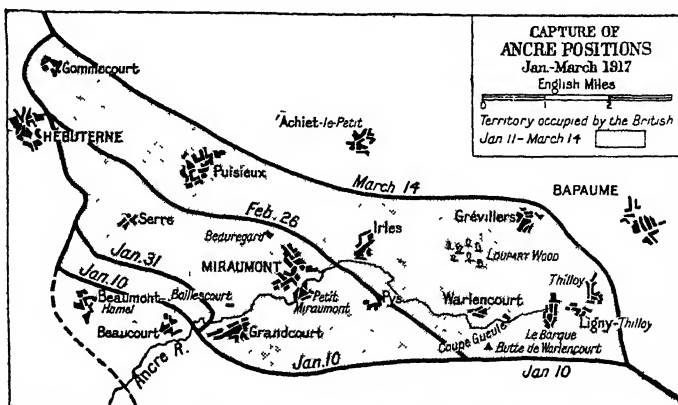
of the Ancre the 39th division entered St. Pierre Divion, suffering casualties from the British barrage which it overran in its impetuosity. Over 1,400 Germans were forced by the swiftness of this attack to lay down their arms.

On Nov. 15 the Germans delivered a counter-attack, which was crushed without the loss of any of the points gained. Up to this date over 6,000 prisoners had been taken, the largest number yet captured in any battle on this part of the western front. On Nov. 17 the British right made a small advance S. of Grandcourt, but against a fierce resistance the troops could not maintain themselves there. The Germans, however, were left in a difficult position at Grandcourt, which could now be enfiladed and attacked from both flanks.

This was the closing episode of the series of battles on the Somme, and it so weakened the German positions there as to render a retreat inevitable. The British armies, after continuous fighting for more than four months in cruel weather conditions, also needed a respite. Casualties were heavy on both sides.

Local Attacks

As the winter prevented large-scale operations, the British command now decided to carry out local attacks. On Jan. 11, 1917, the ridge E. of Beaumont-Hamel was stormed after a prolonged artillery preparation. On Feb. 6 the German line S. of the river was abandoned as far as a point lying S.W. of Miraumont. On Feb. 17 an attack was delivered on both sides of the Ancre. On Feb. 24, after several fruitless counter-attacks on the British front, the enemy evacuated their



Ancre Battles. Plan showing the territory taken by the British during the renewal of the contest in the opening months of 1917

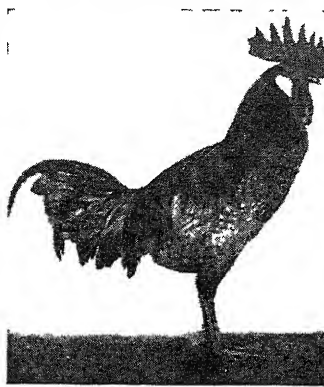
advanced line S. of Miraumont and Pys, and next day British troops occupied Serre, Miraumont, Pys, and Warlencourt, with the commanding ground near. Owing to the break-up of the intense frost which had followed an unusually wet autumn, close pursuit of the Germans was impossible while the whole country became a sea of deep mud. Iries, however, was stormed on March 10, and on March 13, after a terrific bombardment, Gréville and Loupart Wood were seized by the British. Then followed the German retirement "according to plan" to the Hindenburg line (q.v.).

Ancren Riwle. A manual for anchoresses, attributed to Richard Poor, bishop of Durham. It prescribes a rule of life for three ladies, who, with a small company of lay sisters, led a religious life at Tarrant-Kaines in Dorset. The rule is dictated by a spirit of wisdom and common sense, forbidding excessive austerity, and is pointed by distinct and racy humour; it is further animated by a spirit of holiness that finds expression in many passages of extreme devotional beauty. The manual is usually attributed to the early 13th century, but is possibly older. *Consult* Ancren Riwle, ed. J. Morton, Camden Society, 1853.

Ancrum. Parish and village of Roxburghshire, Scotland, 3½ m. N.N.W. of Jedburgh. It was at Ancrum Moor, 2 m. N.W., that 5,000 English were defeated on Feb. 17, 1545, by the Scots. A monument marks the spot where Lilliard, a Scottish maiden, is said to have distinguished herself in battle. Of great antiquity, Ancrum has one of the best-preserved crosses in the Border country. Pop. 858.

Ancus Marcius. Fourth legendary king of Rome, 640-616 B.C. The reputed grandson of King Numa, he is credited with the foundation of the port of Ostia, at the mouth of the Tiber, and the fortification of the Janiculum, which he connected with the city by a wooden bridge, called the Pons Sublicus or bridge of piles. He is also said to have built the first Roman prison. He subdued the Latins, and brought some of them to the Aventine.

Ancyra. Ancient town of Asia Minor, site of the Ankara of today. Stone lion reliefs attest its importance in late Hittite times. Fortified about 250 B.C. by Gallic immigrants, it was made in 25 B.C. the chief town of the Roman province of Galatia. A marble tem-



Andalusian Fowl. Cockerel that won many prizes as a typical specimen

ple to Augustus contains the *Monumentum Ancyranum*, a mural record of the emperor's life-work. The Christian church is mentioned A.D. 192, and an ecclesiastical council was held here in 314.

Andalusia. Region of Spain, formerly one of the provinces. The name is variously said to be a corruption of Vandalusia, i.e. the land of the Vandals, or derived from the Moorish Andalus, land of the West. The region now comprises eight provinces: Almeria, Granada, Malaga, Cadiz, Jaén, Cordova, Seville, and Huelva. Its area is 33,777 sq. m.

Andalusia is in the S. of the country and, lying as it does on either side of Cape Trafalgar, its coasts front both the Atlantic and the Mediterranean. The land boundaries are Portugal, New Castile, and Murcia. It includes some of the most historic and interesting parts of Spain, e.g. the Moorish kingdom of Granada, the cities of Cordova and Seville, and the seaport of Cadiz. It chiefly consists of the valley of the Guadalquivir with the southern slopes of the Sierra Morena and the bulk of the Sierra Nevada between the river and the Mediterranean coast. It produces copper, principally from the rich Rio Tinto mines, and manganese, molybdenum, and platinum, also oranges, olives, and other sub-tropical fruits. It was a Roman province, and after the withdrawal of the Romans became the prey of various barbarian invaders. For about 800 years it was under the Moors, whose influence is still seen everywhere. Pop. 4,592,621.

Andalusian Fowl. A Spanish breed of poultry introduced into England in 1851 from Andalusia. In egg production it compares favourably with other Mediterranean

breeds, laying a large, white-shelled egg. As it thrives equally well in confinement or at liberty, and is hardy and robust, it is adapted to farmer and backyarder alike. The body colour is a slate blue, laced with feathers of a darker tint; the legs are a dark leaden hue, earlobes white. The average weight of the cocks is 7 lb. to 8 lb.; and of the hens 4½ lb. to 5½ lb.

Andalusite. Aluminium silicate, of the same composition as sillimanite and cyanite. It crystallises in forms belonging to the orthorhombic system, is a product of the thermal metamorphism of aluminous sediments, and occurs most commonly in argillaceous rocks that have been heated by the intrusion of large masses of igneous rocks. The temperature required for its formation is less than that needed for sillimanite. It often contains foreign matter arranged in a symmetrical manner, and is then called chiasstolite (q.v.). Andalusite is used as a refractory material and for making porcelain cores for sparking plugs.

Andamanese. Aboriginal race inhabiting the Andaman Islands, said to be the last pure remnant of Palaeolithic man. Numbering 62 in 1941, dark-skinned and frizzy-haired, they are of negrito stock, averaging 4 ft. 10½ ins. in height. They hunt land animals and fish with arrows, and turtle and shark with detachable harpoons in dug-out canoes. Their utensils are largely of shell; their huts often lean-tos, roofed with cane leaves. Their animism is primitive. Skulls of relatives are worn round the neck. They are the only people who do not know how to make fire. Belonging to a dozen tribes, they live in groups of



Andamanese. Tribal chief of the North Andaman aborigines

coast-men and jungle-men, and speak dialects of remote origin and with no living affinities.

Andaman Islands. Group of islands in the Bay of Bengal, 120 m. S.W. of Burma. Together with the Nicobar Islands, they form a province of India. They consist of six main islands—North, Middle, South and Little Andaman, Baratang, and Rutland—and about 200 small islands and islets, and have an area of 2,508 sq. m. They are covered with dense tropical jungle, volcanic, and hilly, attaining a maximum elevation of 2,402 ft. in Saddle Peak, in North Andaman, and have several well-sheltered natural harbours, the chief being Port Blair, the capital, Port Cornwallis, and Stewart Sound, which are used as refuges during stormy weather in the Bay of Bengal. From the forests large quantities of timber are obtained. Tea and coconuts are cultivated. The islands were utilised from 1858 by the Indian government as a penal settlement; 6,165 convicts were on the islands in 1941, about one-fifth of whom were ticket-of-leave men supporting themselves. Transportation to the Andamans ceased in 1921, and in 1945 the Indian government announced that the penal settlement would be abolished. The islands are notoriously unhealthy. Pop. 21,483.

During the Second Great War the islands were occupied by the Japanese, enemy planes first flying over Port Blair and bombing that target on Feb. 24, 1942, and again on Feb. 26. Very little opposition could at that time be offered. The British population was therefore evacuated, and everything of value destroyed. Japanese troops landed on Mar. 26, and established bases from which their bombers and flying boats could harry Indian waters and attack the Indian coastal towns. On April 4, U.S. Fortresses stationed in India made a heavy

attack on Japanese shipping off the Andaman Islands, sinking a cruiser and setting a troopship ablaze. U.S.-British raids continued until the end of the war to prevent the Japanese from using



Andaman Islands. Lying in the Bay of Bengal, they were of strategic importance in the Second Great War

the islands as a base for any attack on India.

Andante (Ital., going slowly). Musical term, meaning at a moderate pace. In practice, such terms as *andante* and *allegro* are often used as nouns to distinguish particular parts of a musical work, e.g. the *andante* of a symphony, i.e. the movement marked *andante* in the score. The diminutive, *andantino*, means slower than *andante*.

Anderida. Roman flint fort at Pevensey, Sussex, England. It was probably erected by the count of the Saxon shore early in the 4th century. It was beset by the Saxon invaders under Ella and Cissa in A.D. 491, and later became their settlement of *Andredeceaster*. Much of its masonry was incorporated in the Norman castle of Pevensey. See Pevensey.

Andermatt. Village of Switzerland, in the canton of Uri. It lies in the upper valley of the Reuss, 3 m. S. of Göschenen, and stands 4,738 ft. above sea level, near the junction, at Hospenthal, of the roads over the Furka and St. Gotthard passes. It is famous as a centre for winter sports.

Andernach. Town of Germany. On the left bank of the Rhine, it is about 10 m. N.W. of Coblenz.

Originally a Roman station, it was afterwards a free city, and later came under the electors of Cologne. It became Prussian in 1815. Chemicals, cigars, and malt were manufactured, and there was trade in wine. Pop. 10,771.

During the Second Great War railways and marshalling yards at Andernach were R.A.F. targets on Dec. 27, 1944. The U.S. 3rd army occupied the town, in the fighting for the approaches to the Rhine, on March 9, 1945.

Anders, GENERAL WLADYSLAW (b. 1892). Polish soldier. Before the First Great War he was a student of mechanical engineering at Riga. He served in the Imperial Russian army 1914-17, but fought for Poland during the Russo-Polish hostilities of 1919-20. On the outbreak of the Second Great War in 1939 he commanded a Polish cavalry brigade, but was taken prisoner by the Russians and sent to Russia, where he spent 20 months in solitary confinement. After the Russo-Polish pact of July, 1941, Anders was freed to form new Polish divisions in the fight against the Germans. Later sent to Persia, these troops received intensive training as the Polish army of the Middle East.

In Feb., 1944, Anders took command of the Polish 2nd corps fighting in Italy. His services there were rewarded with the Order of the Bath. A year later the Polish Govt. in London appointed him acting C.-in-C. of Polish armed forces, until Gen. Bor-Komorowski (leader of the Warsaw rising, Aug., 1944) was released and resumed command in May, 1945. Anders returned to England in Aug., 1946, to supervise the demobilisation of the Polish 2nd corps. He was deprived of his nationality by the Warsaw govt., Sept. 27, 1946.

Andersen, HANS CHRISTIAN (1805-75). Danish story-teller and poet. Born at Odense, Fünen, Denmark, April 2, 1805, the son of a shoemaker, he had little schooling. Possessed of a natural gift for singing, he sought an engagement in the Copenhagen theatre, but was unfitted for the stage.

In 1830 Andersen published his first volume of poems, including the widely translated *Dying Child*. Three years later he received from the Danish king a pension, which enabled him to travel in Germany, England, Spain, and the East. A prolific writer, he produced an almost continuous series of poems, dramas, novels, and narrative

descriptions of scenery and manners. It is, however, for his wonderful short tales for children that he is best remembered, and will be longest known. These include *The Ugly Duckling*, *The Tin Soldier*, *The Little Match Girl*. On his 70th birthday Christian IX decorated him with the Grand Cross of the Dannebrog, and an album containing one of his tales in fifteen languages was presented to him by his admirers. He died at Copenhagen, Aug. 4, 1875. *Consult* *Life*, S. Toksvig, 1933.

Anderson. Chief city of Madison county, Indiana, U.S.A. It stands on the White river, at the junction of several rlys., 35 m. N.E. of Indianapolis. It has manufactures of iron, steel, brass, paper, and glass. Pop. 41,572.

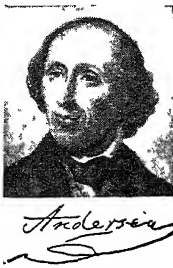
Anderson, CARL DAVID (b. 1905). American physicist. Born Sept. 3, 1905, in New York, he was educated at Los Angeles and Pasadena, and the Californian Institute of Technology, becoming lecturer in physics there, 1927, research fellow in 1930, professor in 1939. Devoting himself to research in gamma and cosmic rays, he discovered the positron (*q.v.*), and was awarded the Nobel prize for physics in 1936.

Anderson, ELIZABETH GARRETT (1836-1917). First British woman doctor. Born in London, she



E. Garrett Anderson.
British doctor
Olive Edis

began to study medicine in 1860, but was unable to obtain admittance to any of the British medical schools. In 1865 the Society of Apothecaries gave her the degree of L.S.A., and in 1866 she opened a dispensary in London, which developed into the New Hospital for Women in Euston Road, of which she was senior physician for 24 years. Graduating at Paris as M.D. in 1870, she was for 23 years lecturer and ten years dean of the London School of Medicine for Women. Dr. Anderson was a member of the first London School Board, 1870. Her greatest victory, perhaps, was the formal admission of women to the degrees of the



British Medical Association in 1892. In 1908 she became mayor of Aldeburgh, Suffolk, the first woman to hold mayoral office in England. She died at Aldeburgh, Dec. 17, 1917. She married J. G. S. Anderson, a ship-owner, in 1871. Their son, Sir Alan Garrett Anderson, was controller of the navy during 1917-18 and in 1941 became controller of railways under the ministry of War Transport and chairman of the railway executive. Their daughter, Dr. Louisa Garrett Anderson, organized during the First Great War the first army hospital which was managed and officered by women in France. She wrote a *Life of Elizabeth Garrett Anderson*, 1939.

Anderson, JAMES (1739-1808). Scottish agricultural economist. Born at Hermiston, near Edinburgh, he became a farmer when little more than a boy, at first near his birthplace, then in Aberdeenshire. He studied chemistry and sought to apply science to the service of agriculture; and is regarded as the inventor of the Scottish plough, a small two-horse plough without wheels. In 1773, in one of his pamphlets, he anticipated Ricardo's theory of rent. In 1783 he gave up his farm and settled in Edinburgh, where for some years he conducted a weekly paper. His last years were passed at Isleworth, where he continued his experiments in agricultural processes. He died Oct. 15, 1808.

Anderson, SIR JOHN (b. 1882). British administrator and politician. Born July 8, 1882, and educated at George Watson College, Edinburgh, and the universities of Edinburgh and Leipzig, he entered the colonial office in 1905. In 1912 he was principal clerk in the office of the Insurance Commissioners and in the following year their secretary. From 1917-19 he was secretary to the ministry of Shipping; and after serving at the Local Government Board and the ministry of Health he was chairman of the board of Inland Revenue, 1919-22, chief under-secretary to the lord lieutenant of Ireland 1920, and permanent under-secretary of state to the home office, 1922-32. During 1932-37 he was governor of Bengal.



Sir John Anderson,
British politician

Returning to the U.K. he was elected National M.P. for the Scottish Universities and appointed lord privy seal in Chamberlain's cabinet, 1938-39 and home secretary and minister of Home Security, 1939-40, when he became lord president of the council. From 1943 to 1945 he was chancellor of the exchequer, and during 1945-48 was chairman of the atomic energy advisory committee. *See* *Anderson Shelter*.

Anderson, SIR KENNETH ARTHUR NOEL (b. 1891). British soldier. Born on Christmas day, 1891, he was educated at Charterhouse and Sandhurst. In the First Great War he served with distinction, and during 1930-31 he was stationed on the N.W. frontier of India. During the Second Great War he commanded a division at Dunkirk in 1940, and was appointed G.O.C.-in-C. Eastern Command in April, 1942. In Nov. of the same year he was appointed commander of the British 1st army in the N. Africa campaign, and assisted, under Gen. Alexander, in carrying out the strategy which led to the final defeat of the Axis in N. Africa (*see* *Tunisia*, *Battle of*). G.O.C.-in-C. in E. Africa, 1945-46, Anderson was appointed governor and c.-in-c. Gibraltar in 1947.

Anderson, MARY ANTOINETTE (1859-1940). American actress. She was born at Sacramento, California, July 28.



Mary Anderson,
American actress

1859, and was the daughter of an English father and a German mother. When she was only six months old her parents moved to Louisville, Kentucky, where she was educated at a convent. She made her first appearance on the stage as Juliet, Nov. 27, 1875. After achieving enormous success in her own country, in 1883-87 she had seasons in London, occupying the Lyceum Theatre during the absences of Henry Irving in America. Her chief productions were *Ingomar*, *The Lady of Lyons*, *Gilbert's Pygmalion and Galatea*, *Romeo and Juliet*, and *A Winter's Tale*, in which she doubled the parts of *Hermione* and *Perdita*. In 1889 she retired from the stage, and in 1890 married Antonio de Navarro, and settled in England, where she died May 29, 1940. She published *A Few Memories*, 1896.

Anderson, MAXWELL (b. 1888). American author and playwright. Born at Atlantic City, Pa., Dec. 13, 1888, and educated at North Dakota and Stanford universities, he became a journalist, writing for papers in San Francisco and New York. From 1923 he wrote many plays, including *Saturday's Children*, 1927, and *Both Your Houses*, 1933, which was awarded the Pulitzer Prize. He is notable for his success with plays written in blank verse on modern themes, e.g., *Winterset*, 1935. He has also written poems and essays.

Anderson, SHERWOOD (1876-1941). American novelist. Born in Camden, Ohio, Sept. 13, 1876, the son of a harness-maker, he was largely self-educated, and started his career in an advertising agent's office. His first novel, *Windy Macpherson's Son*, appeared in 1916. *Winesburg, Ohio* (short stories), 1919, was his first popular success, and he followed it with many books dealing with the life and aspirations of small American towns. He also published two volumes of verse, *Mid-American Chants*, 1918, and *A Note Book and a New Testament*, 1926.

Anderson, SIR WILLIAM (1835-98). British engineer. Born Jan. 5, 1835, at St. Petersburg, and educated there, he afterwards studied applied science at King's College, London, and, joining a London firm of engineers in 1864, ultimately became its head. In 1888 he was invited by the British War Office to design machinery for the manufacture of cordite, and in 1889 was appointed director-general of ordnance factories. At Woolwich he conducted important investigations in connexion with the manufacture of large guns. He was created K.C.B. in 1897, and died at Woolwich Arsenal, Dec. 11, 1898.

Anderson Shelter. Small domestic air-raid shelter, designed and invented by William Patterson, an engineer friend of Sir John Anderson (*q.v.*). The patent was presented to the nation. The scheme, which provided for pressed and rolled sectional shelters ready for home assembly, to be supplied to 20,000,000 persons living in houses with no other suitable protection, was subsequently submitted to a committee of engineers. With certain modifications the shelter was adopted in Dec., 1938. On the outbreak of war in 1939, Anderson shelters were supplied free to those with incomes under £250 p.a., whose households included two children of under

school-leaving age. This income limit was raised if there were more children. The efficacy of the shelter, which was designed to hold four adults or two adults and four children, was proved in the heavy German air raids on the United Kingdom, 1940-41. It withstood the impact of debris and blast, and saved the lives of countless people in the bombed areas. Its name was given in compliment to Sir John Anderson,

home secretary at the time of its adoption. See *Air Raid Shelter*.

Andersonville. A village of Georgia, U.S.A., in Sumter county. It is 60 m. S.S.W. of Macon. In the prison, used by the Confederates in the Civil War, nearly 13,000 prisoners out of some 50,000 died between Feb., 1864, and April, 1865. The Governor, Henry Wirz, was hanged for his cruelties in the following Nov. The prison grounds are now a national park.

ANDES: MOUNTAINS OF SOUTH AMERICA

C. Reginald Enock, Author of *The Andes* and *The Amazon*

Information in this general survey should be supplemented by reference to the article on South America and those on separate states, such as Bolivia, Colombia, Ecuador; towns such as Bogotá, Quito; and individual mountains, such as Chimborazo, Cotopaxi

The mountain system of the Andes extends in an almost unbroken line throughout S. America from N. to S., a distance of over 4,000 m., traversing Colombia, Ecuador, Peru, Bolivia, and Chile, with Argentina, and contains some of the highest peaks and most stupendous mountain scenery in the world.

The great Cordillera, as the Andes are in general termed locally, rises to an elevation throughout the main part of its course of 14,000 ft., with the higher summits over 20,000 ft., paralleling the Pacific coast at no great distance therefrom; and forms a gigantic barrier between the E. and W. portions of the continent, crowned in many places with perpetual snow. The system embodies various well-defined parallel ranges connected at intervals by *nudos* or knots, enclosing lofty, bleak and arid tablelands, or, separated by deep valleys, the basins of rivers which flow either to the Atlantic or to the Pacific, mainly the former. The Andes are treeless, except in the ravines, but the uplands are generally covered with coarse grass, the natural food of the llama and the vicuña.

Groups of the Cordillera

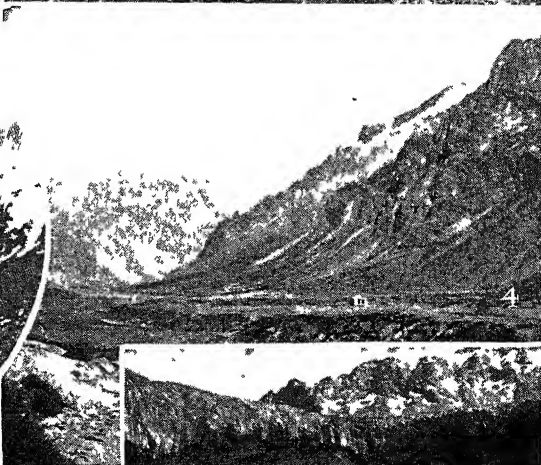
The Cordillera reaches its greatest development about mid-way in its course, and is broadest near that portion where its direction changes from N.N.W. to almost due S., where it is about 500 m. wide. In Colombia it splits into four ranges, the Eastern, Central, Western, and Chocó, and in the valleys thus formed flow the Magdalena, Cauca, and Atrato rivers. The high *páramos*, or mountain plateaux, with their abrupt edges, form conspicuous landmarks, and the central range culminates in a line of volcanoes rising from 2,000

ft. to 3,000 ft. above the snow line, which here is found at about 15,000 ft. The Mesa de Herveo, an extinct crater six miles in diameter, presents a striking appearance with its 3,000 ft. of snowy drapery. The most important, however, is the Eastern Cordillera, along the eastern flanks of which is situated the main population of Colombia, including that of the city of Bogotá.

The Snow-clad Ecuadorian Peaks

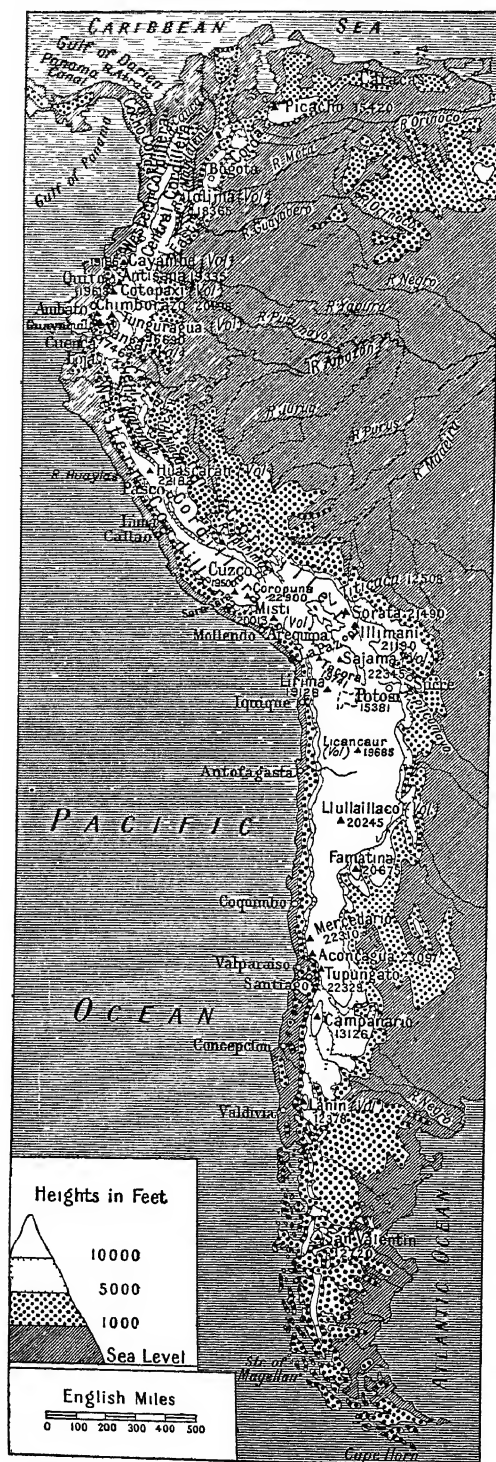
The Andes in Ecuador embody two great chains, known as the Eastern and the Western Cordillera, continuations of the Western and Central Chains of Colombia, enclosing the basins or tablelands of Quito, Ambato, and Cuenca. Overlooking these, and grouped in remarkable symmetry on either side, forming as it were an immense avenue, are the snow-clad Ecuadorian peaks, some of which are active volcanoes.

Grouped almost within sight of each other are twenty-two such peaks, the W. chain containing the highest and the E. the greatest number. Among them are Chimborazo, 20,498 ft., rising 5,000 ft. above the snow line, its double dome generally covered with mists; Cotopaxi, the highest active volcano in the world, 19,613 ft., with a cloud column of smoke always above its cone, and dreaded for its constant eruptions; Antisana, 19,335 ft.; Cayambe, 19,186 ft.; and others ranging downwards to 15,000 ft. The high Andes of Ecuador give birth to several of the large affluents of the Amazon, some of which break through the Eastern Cordillera. The railway which ascends the W. slope from Guayaquil reaches a height of 11,841 ft. on the base of Chimborazo and also skirts the foot of Cotopaxi, on its way to Quito.



1. Rocky pinnacled mass known as Los Penitentes (The Penitents) 2. In the Uspallata Pass, Chile 3. Christ of the Andes, colossal statue at Puente del Inca, on the Argentine-Chile border. 4. View in the Andes showing the character of the slopes. 5. Cerro Tolosa, above the snow line. 6. A natural rock bridge known as the Bridge of the Inca

ANDES: AMONG HIGH PLACES IN THE GREAT MOUNTAIN SYSTEM OF SOUTH AMERICA



Andes Map of the western coast of South America illustrating the relative elevations of the great mountain chain from the north-west coast to Cape Horn

In Peru the Andes consist of three main chains: the Western, the Central, and the Eastern Cordillera, of which the Western and the Eastern are the most important. They are joined transversely by the knots of Loja (Ecuadorian border), Pasco, Viltcanoa or Cuzco, and Potosi (Bolivian border). As in Ecuador, great basins or tablelands are enclosed by these features, with deep river valleys or great lakes. The main ranges rise to from 14,000 ft. to 16,000 ft., and the perpetual snow line is at about 14,000 ft. There is one low gap in the chain, in N. Peru, of about 7,000 ft. The highest peaks are the Huascarán, 22,822 ft., forming part of the White Cordillera of Ancachs; Huandoy, 21,088 ft.; Coropuna, 22,900 ft.; the Misti, 20,013 ft.; Sara-Sara, 19,500 ft.; Lirima, 19,128 ft.; and Tacora, 19,741 ft. Some of the Peruvian peaks are volcanoes, but generally quiescent. The Central Cordillera forms the water-parting. The Peruvian coastal slope and plains are generally less than 100 m. wide, and form a rainless belt, due to the interception of the moisture-laden wind from the Amazon valley by the Andes. The Silurian, Carboniferous, Jurassic, and Cretaceous formations are encountered. Enormous fossil ammonites are found in places, and the tilted strata of the summits are often of striking appearance. In the depressions between the Cordilleras flow the great Amazon affluents: the Marañon, the Huallaga, the Apurimac, and others have their sources in the snowcap, and break through the ranges in a series of remarkable cañons on their way N. to join the Amazon; while the Huaylas river flows to the Pacific. In the S. of Peru the Central Cordillera disappears, and the Eastern and Western enclose the basin of the great lake, Titicaca, 165 m. long and 12,508 ft. above sea level.

The Andes in Bolivia form one of the most impressive mountain masses on the globe. The Eastern and Western Cordilleras continue their course with a number of high peaks, chief of which are Sorata, 21,490 ft., and Illimani, 21,190 ft. Between these extends perhaps the most striking snowy range of the whole system. Huaini-Potosi reaches 20,260 ft.

In Chile the Andes form one main chain, with a lesser maritime Cordillera, and the system approaches much nearer the coast. The great peak of Aconcagua, 23,097 ft., is the highest mountain in the New World. For some 1,500 m. the snowy Cordillera forms the boundary between Chile and Argentina. Between the main and the maritime ranges of much older formation lies the long Vale of Chile. The height of the Andes decreases in the S. of Chile, and the glaciers end in the sea. It is held that some portions of the Andes are rising, others sinking.

These mountains are rich in metalliferous and other minerals, notably gold, silver, copper, tin, lead, quicksilver, zinc, and, in places, coal. They are ascended by several lines of railway, including the Guayaquil-Quito line; the Oroya and the Southern, in Peru, reaching 15,660 ft. and 14,660 ft.; and the Transandine, in Chile. Earthquakes, due mainly to tectonic action, and tidal waves following thereon have often been the cause of loss of life and property throughout the Andine region and Pacific littoral.

Among the principal ascents of the Andes peaks are those of Chimborazo in 1802 by Humboldt, in 1831 by Boussingault and Hall, and in 1880 by Whymper; Cotopaxi in 1872 by Reiss and in 1880 by Whymper; Aconcagua in 1897 by Zurbriggen and Vines, in 1898 and 1900 by Conway, and in 1902 by Rankin; Huascarán in 1905 by Enock and others.

Bibliography. Travels Amongst the Great Andes of the Equator, E. Whymper, 1892; Wanderings in the Peruvian Andes, A. M. Renwick, 1939; The Face of S. America, T. L. Rich, 1942.

Andesine. Member of sodalime or plagioclase feldspar group. It has a composition between oligoclase and labradorite, and occurs as small crystals in igneous rocks, especially lavas. It is known only as a product from fusion.

Andesite. Lava characterised by the presence of plagioclase feldspar, chiefly andesine, a moderately high percentage of silica, and usually a porphyritic structure. Glassy matter commonly forms the matrix of such rocks. They are subdivided, according to the prevalence of the ferro-magnesian minerals present, into groups, e.g. augite-andesite, mica-andesite, and hornblende-andesite. They are well represented among the lavas of the Andean chain, from which they take their name, but are widely distributed rock-types and occur in most regions of volcanic activity.

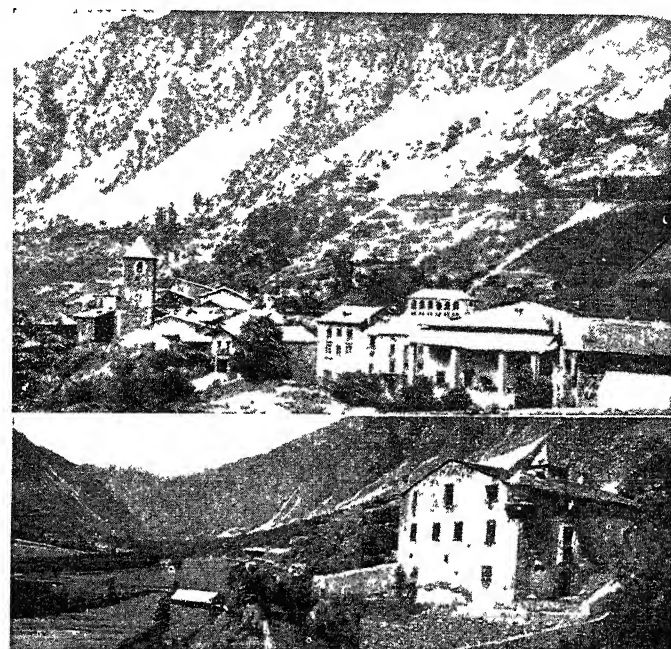
Andijan. A town of Uzbek S.S.R., Soviet Central Asia. It stands near the Syr-Daria, 84 m. E.N.E. of Khokand by the Transcaspian Rly., of which it is the E. terminus. A centre of the cotton industry and noted for horticulture, Andijan was almost entirely destroyed by earthquake in 1902, but has been rebuilt. It was the capital of the Khokand khanate. Pop. 83,691.

Andirons (old French *andier*, mod. *landier*) or FIREDOGS. Iron supports for logs, commonly in use before the discovery of coal, when wood fires were universal, and still used in parts of France and elsewhere where wood is abundant. Firedogs are now generally mere decorative survivals, or used as hearth-rests for fire-irons. In ancient times they were placed in the centre of the room or hall and supported a fixed lower and a movable upper bar; on the lower bar logs were placed criss-cross for burning, the upper one being used for grilling. After the 16th century firedogs for important rooms were arranged to be a little in advance of both sides of the fire. Usually they were of iron in rather a plain design, though sometimes of most elaborate and exquisitely pierced steel work, and occasionally even of solid silver.

Andirons, old design, from Godington, Kent



Andkhui. Khanate and town of Afghan Turkistan, on the Russian border. The town is 100 m. W. of Balk and was subject to Bokhara until 1820, when Mahmud Khan



Andorra, the small mountain republic between France and Spain. Upper picture: The capital, Andorra, showing terraced fields on the mountain slope. Lower picture: In the valley of Andorra, with Parliament House on the right

captured and destroyed it. The khanate was formally annexed to Afghanistan in 1885. Its unhealthy climate, and the prevalence of swarms of flies and scorpions, have earned it the sobriquet of hell upon earth.

Andocides (c. 440-c. 390 B.C.). Athenian orator. In 415 B.C. he was forced to leave Athens under suspicion of being concerned with Alcibiades in the mutilation of the statues of Hermes. After two unsuccessful attempts, in 399 he cleared himself of the charge. Of his three surviving speeches the most important was that delivered in 390, in which he advocated peace with Sparta on her own terms. He was included among the "ten" Attic orators.

Andorra (Arab. *Aldarra*). Republic in the eastern Pyrenees. It lies between the Spanish prov. of Lerida and the French department of Ariège. Surrounded by mts., the territory comprises the upper part of the valley of the Balira, an affluent of the Segre, and adjacent valleys of the Pyrenees, and covers an area of 190 sq. m. Its pop. is 5,230. Much of the revenue accruing to the state was formerly derived from timber, but the forests are rapidly disappearing. Agriculture thrives where the soil is suited to tillage, rye, barley, vines, and tobacco being cultivated. There is also

abundant mineral wealth, especially iron and lead, but transport difficulties make its exploitation doubtful. The inhabitants pay great attention to stockbreeding. Smuggling is fairly general. The natives speak a Catalan dialect.

Andorra is under the joint suzerainty of France and the bishop of Urgel, and its government is entrusted to a council, consisting of twenty-four members holding office for four years, who elect a first and second syndic to preside. The executive rests with the first syndic, while a civil judge and two *viguers*, or magistrates, alternately appointed by the suzerains, exercise judicial power. French interests are guarded by a permanent delegate, the prefect of the Pyrénées-Orientales. An annual payment of 960 fr. is made to the French government and about 460 pesetas to the bishop of Urgel, obtained by a pastures tax. Andorra is reputed to have received its independence from Charlemagne. Andorra la Vieja is the capital.



Andover arms

Andover. Mun. borough and market town of Hampshire, England. On the Anton river, Andover is 57 m. W.S.W. of London by the

ry. Situated in an agricultural district, it carries on malting and ironworking. Here are the R.A.F. staff college and an airfield. Andover was a borough before 1176. In 994 the Norwegian King Olaf was baptized here by S. Alphege. Market day, Fri. Pop. 9,692.

Andover. A town of Massachusetts, U.S.A., in Essex county. It is 23 m. N. of Boston, on the Boston and Maine rly. Settled c. 1643 and named after Andover in England, it became notorious for its witchcraft trials c. 1692. Harriet Beecher Stowe, author of *Uncle Tom's Cabin*, lived and was buried here. Pop. 11,122.

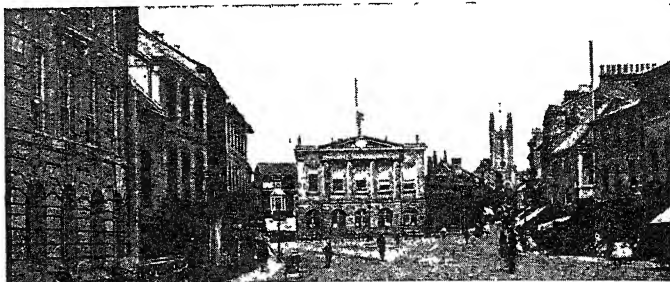
Andrada e Sylva, BONIFACIO José d' (1765-1838). Brazilian statesman. Born at Santos, he studied in Europe, where he was professor of geology at Coimbra. Returning to Brazil in 1819, he took a prominent part in the movement for independence, became minister of the interior and of foreign affairs, 1822, and in 1823 was banished on account of his democratic activities. He took refuge in France, but returned to Brazil in 1829, and died near Rio, April 6, 1838. He published works on mineralogy and a volume of poems.

Andrade, EDWARD NEVILLE DA COSTA (b. 1887). British scientist. Born in London, he was educated at S. Dunstan's College, Catford, University College, London, and in research departments



E. N. da C. Andrade,
British scientist
Elliott & Fry

at Heidelberg, Cambridge, and Manchester universities, gaining numerous prizes and distinctions. In 1920 he was appointed professor of physics at the Artillery College, Woolwich; in 1928 he became Quain prof. of physics at London university, and in 1960 director of the Davy Faraday research laboratory at the Royal Institution. A fellow of the Royal Society since 1935, he was pres. of the Physical Society in 1943. In the Second Great War he was scientific adviser to the ministry of Supply, 1939-43. One of the popularisers of the results of research, he wrote *The Structure of the Atom*, *Engines*, *The Mechanism of Nature*; and also a volume of verse. Participation in the B.B.C. Brains Trust and other broadcasts made his voice familiar to millions.



Andover, Hampshire, England. High Street in the ancient borough, which is one of the principal agricultural centres of the county

Andrassy, JULIUS, COUNT (1823-90). A Hungarian statesman. He was born March 8, 1823, and was elected to the Pressburg diet in 1847. He took

an active part in the revolution of 1848, and remained in exile until 1857. In 1861 he was again elected to the Hungarian diet, and on the formation of the Dual Monarchy in 1867 was appointed prime minister of Hungary. He was instrumental in the emancipation of the Jews. From 1871 to 1879 he was foreign minister of Austria-Hungary. He represented Austria-Hungary at the Congress of Berlin in 1878 and negotiated the Austro-German alliance with Bismarck in 1879. In 1876 he drew up the Andrassy Note urging reforms upon the Porte. He died Feb. 18, 1890. His second son, Julius Andrassy (1860-1929), held several offices in various Austrian governments, including that of foreign minister towards the end of the First Great War. He wrote *Diplomacy and the World War*, 1920.

André, JOHN (1751-80). British soldier. He was born in London of Franco-Swiss parentage, and during the American War of Independence he joined the British army in Canada, 1774, and became aide-de-camp to Sir Henry Clinton. In this capacity he acted as intermediary in the negotiations between Clinton and the American general, Benedict Arnold, who was planning to betray West Point to the British. André and Arnold met, and on the return journey to the British lines



Major John André,
British soldier
Drawn by himself

André, in civilian clothes, fell into the hands of the Americans. After a court-martial he was sentenced to death as a spy and hanged at Tappan, New York, Oct. 2, 1780. André's fate, just though it was, aroused a great deal of sympathy. A monument was erected to him in Westminster Abbey, and his remains were reinterred there in 1821. See *Narrative of the Causes which led to the Death of Major André*. J. H. Smith, 1808; *Vindication of the Captors of Major André*, E. Benson, repr. 1865.

André, LOUIS JOSEPH NICOLAS (1838-1913). French soldier and politician. He served during the siege of Paris and became a general in 1893. In 1900 he was made minister for war, and in that capacity won notoriety by the measures he took to stamp out monarchical and clerical sympathies among officers. He resigned in Nov., 1904, and died March 18, 1913.



Gen. L. J. N. André,
French soldier

Andrea del Sarto OR ANDREA D'AGNOLO (1486-1531). Italian painter. Born at Florence, and called del Sarto from his father Agnolo's occupation as a tailor, he studied under Giovanni Barile and Piero di Cosimo. While a pupil of the latter he became intimate with Franciabigio, and the two collaborated in *The Baptism of Christ*, the first of twelve frescoes for the Scalzo Cloister. About 1512-13 Andrea married the beautiful Lucrezia del Fede, who squandered his earnings. Some six years later he was invited by Francis I of France to visit that country; and while there, he painted the famous *Charity*, now in the Louvre.

A complaining letter from his wife brought Andrea back to Florence in 1519, and in her society he forgot his solemn promise to the French king to return. He even



Andrea del Sarto. His well-known
"Portrait of the Artist"
National Gallery, London

misappropriated funds entrusted to him for the purchase of works of art. Though plentifully employed in Florence, he gradually sank into indigence, and finally fell a victim to the plague, Jan. 22, 1531.

He is finely represented at the Uffizi and Pitti galleries, and in the National Gallery, London, by a Holy Family and a portrait of himself. His famous frescoes include the Cenacolo of the S. Salvi Convent, the series of S. Philip Benizzi in the Church of the Annunziata at Florence, and the Scalzo series. Del Sarto, contemporarily nicknamed "the faultless painter," had an imitative and a creative genius, a great sense of structure, drawing, and colour, and a marked homeliness of style. The conflict between his art and his amours is the subject of a discerning narrative poem by Browning.

Andreani, ANDREA (c. 1560-1623). An Italian wood engraver. He was a native of Mantua. He engraved pictures after Mantegna, Raphael, Titian, Parmigiano, Boccacini, and other masters. He drew in a free and vigorous style and obtained his chiaroscuro by printing from several blocks of various shades, much after the method employed in chromolithography. His prints are rare.

Andreas. Unsigned poem attributed to Cynewulf, preserved in the Early English MS. known as the Vercelli Book. The story is based on the Acts of S. Andrew and S. Matthew, a Greek MS. which contains the adventures of those apostles among cannibals of Africa. In the Andreas both the speech and the setting are changed to English. S. Andrew sails to England with a company of thanes

and angels, with Christ among them. After landing he rescues S. Matthew and suffers persecution; most of his persecutors are destroyed by flood and fire, and after converting the remainder he founds a church and puts to sea.

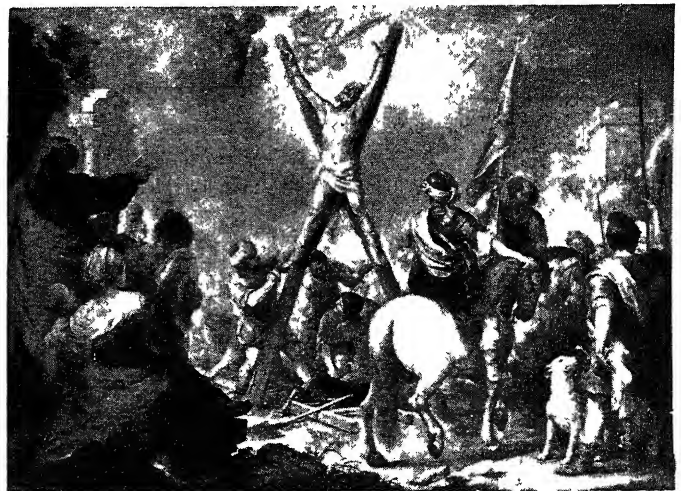
Andredswæld. Early English name of a woodland waste extending from Folkestone to Southampton Water, between the N. and S. Downs. This uninhabited wild—now the Weald—long formed a barrier between the Sussex and Wessex kingdoms, traversed only by Stane Street (*q.v.*). Its timber was afterwards employed for smelting Sussex iron. Scattered relics of the original forest remain in Ashdown and Tilgate, as well as in avenues along many of the roads, and in long lines of trees separating the farmers' fields.

Andrée, SALOMON AUGUST (1854-97). Swedish balloonist. He was born at Grenna, Oct. 18, 1854. He showed early a marked interest in ballooning, and worked at a plan for reaching the North Pole in this way. In July, 1897, accordingly, he left Danes Island, Spitzbergen, with two others. Nothing more was learnt of him until the summer of 1930, when a party of Norwegian scientists discovered the bodies of Andrée, Strindberg, and Fraenkel on the ice at White Island, near Franz Josef Land. With the bodies were found logs and diaries recording the balloon's progress and descent on the ice, also many valuable photographic negatives.

Andrew (Gr. *andrios*, manly). Masculine Christian name. It is

especially popular in Scotland, largely because S. Andrew became the patron saint of that country. It is also used in countries where the Greek Church is dominant, *e.g.* Russia and Greece.

Andrew, SAINT. One of Christ's apostles. A native of Bethsaida, a fisherman, and a follower of John the Baptist, he left the latter to follow Jesus (John 1), to Whom he immediately brought his brother Simon Peter. With his brother he was one of the two first called to apostleship (Mark 1), to be "fishers of men." Prominent at the feeding of the 5,000 (John 6), and on the occasion when certain Greeks sought to see Jesus (John 12), he was one of those who on the Mount of Olives heard the prophecy of the fall of Jerusalem (Mark 13). The accounts of his later life are purely traditional. He is said to have preached in Scythia and so to have become patron saint of Russia, and to have suffered martyrdom at Patrae about A.D. 70, being bound with cords to a cross decussate (X). A woman named Maximela had his body embalmed and suitably interred, and part of his cross is said to be in one of the piers supporting the dome of S. Peter's at Rome. Tradition adds that his relics were removed to Constantinople, whence some of them were taken in the 8th century to Scotland, of which country he is also the patron saint. As S. Andrew's day, Nov. 30, is the festival nearest to Advent Sunday, it must always fall either at the beginning or at the end of the Church year.



Andrew The martyrdom of S. Andrew, one of Christ's apostles, depicted by the great Spanish painter Murillo
Madrid

Andrew I OR ARPAD (d. 1061). King of Hungary. Cousin of King Stephen, he owed his accession in 1046 to a pagan rebellion, which he crushed. In 1049 he invoked the aid of his warrior brother Bela against the emperor Henry III, who in 1052 acknowledged the independence of Hungary. While childless Andrew had promised the succession to Bela, but on the birth of a son a feud arose between the brothers, ending in the defeat and death of Andrew near the river Theiss. He was succeeded by Bela.

Andrew II OR ARPAD (d. 1235). King of Hungary. The younger son of Bela III, he succeeded his nephew Ladislas in 1205. and in 1217 led a futile crusade to the Holy Land. His reckless policy of endowing the nobles with the estates of the crown left him at the mercy of the nobility, and in 1222 he was compelled to promulgate the charter known as the Golden Bull, under which the nobles were exempted from both taxation and foreign military service. In 1234 he defeated the invading army of Frederick of Austria.

Andrew III OR ARPAD (d. 1301). King of Hungary. The grandson of Andrew II and son of Stephen by an Italian mother, he was born and educated in Venice, where his father had settled in early life. He succeeded Ladislas as king in 1290, and was the last male representative of the Arpad dynasty, founded in the 10th century (*see* Arpad). The last seven years of his reign were disturbed by civil war. He died suddenly, and was succeeded by Charles Robert of Naples.

Andrewes, LANCELOT (1555-1626). Anglican divine. Born in the parish of All Hallows', Barking, London, and educated at Pembroke Hall, Cambridge, of which he was appointed master in 1589, he was ordained in 1580. His loyalty to the Church of England was recognized by Elizabeth, who made him vicar of S. Giles's, Cripplegate, 1589, a court chaplain, 1590, and dean of Westminster, 1601; and by James I, who promoted him to the bishoprics of Chichester, 1605, Ely, 1609, and Winchester, 1619. He took part in the Hampton Court Conference 1603-4, and in the preparation of the Authorised Version of the Bible. On his death, Sept. 26, 1626, Milton, then only 17 years old, wrote a Latin elegy.

Of his literary work, which fills eight volumes in the Library of Anglo-Catholic Theology, the Manual of Private Devotions has

made the widest appeal, and has been frequently reprinted. A strong supporter of the royal supremacy and the divine right of kings, Andrewes was no flatterer, an equally strong High Churchman, he imposed no penalty on those who differed from him. As a controversialist against Rome his talents are fully displayed in the replies to Cardinal Bellarmine on the subject of the oath of allegiance demanded by James I. His preaching and personal character were alike extolled by contemporaries. Bishop Andrewes is buried at S. Saviour's, Southwark, and in 1919 his tomb was moved from the Lady Chapel to a position on the south side of the high altar.

Andrews, CHARLES FREER (1871-1940). English missionary. Born in Newcastle-on-Tyne, Feb. 12, 1871, he was educated at Pembroke College, Cambridge, and in 1896 became head of the Pembroke College mission in the London slums. In 1904 he went to India and joined the Cambridge Brotherhood at Delhi. Having become a close friend of Gandhi, he cooperated with him in his attempts to secure Anglo-Indian understanding. In 1913 he became a member, later president, of Sir Rabindranath Tagore's Institute at Santiniketan, and died there April 4, 1940. He wrote on the application of Christianity to modern problems, and also a biography of Gandhi.

Andrews, JOHN MILLER (b. 1871). Northern Irish statesman. Born July 17, 1871, he was educated at the Royal Academical Institution, Belfast, and developed his interests as a flax spinner and landowner. He was elected as a Unionist by Co. Down to the parliament of N. Ireland, 1921, and was a cabinet minister for 19 years, having charge of labour until 1937, then of finance. In 1940 he succeeded Lord Craigavon as premier, retiring 1943 in favour of Sir Basil Brooke.

Andrews, ROY CHAPMAN (b. 1884). American naturalist and explorer. Born at Beloit, Wisconsin, Jan. 26, 1884, he was educated at Beloit college and Columbia university, and joined the staff at the American Museum of Natural History, New York. He was a member of an exploring expedition to Alaska in 1908 in 1909-10 he was naturalist on board U.S.S. Albatross on a voyage to the Netherlands East Indies, Borneo, and Celebes; in 1911-12 he explored Korea; and in 1913 he was a member of the

Borden expedition to Alaska. Subsequently he led three expeditions to Central Asia on behalf of the American Museum of Natural History, achieving results of the greatest value to science. Fields rich in fossils were discovered in Mongolia, and large areas of the Gobi Desert were mapped out, showing parts of it fit for commercial motor traffic. Bones of prehistoric animals were discovered on the central Asian plateau, also the first dinosaur eggs known to science, as well as evidences of primitive human life. From 1935-42 he was director of the Museum. He wrote a number of books, including *Whale Hunting with Gun and Camera*, 1916. *Ends of the Earth*, 1929; *The New Conquest of Central Asia*, 1932; and *This Amazing Planet*, 1940.

Andreyev, LEONID NICOLAEVITCH (1870-1919). Russian novelist and dramatist. He was born at Orel. Suffering from melancholia in his youth, he is said to have thrice attempted suicide. His stories, which display vivid imagination and something of a morbid delight in the horrible, particularly in the analysis of the psychology of madness, gave the author a position which rivalled that of Maxim Gorky. The first collection was published in 1901. Later he wrote plays, some of which enjoyed considerable success, a Biblical Trilogy—*Judas Iscariot*, *Eleazar*, and *Ben Tobit*—tr. W. H. Lowe, 1910, and a grim description of war, *The Red Laugh*. *Silence and Other Stories* was translated into English by W. H. Lowe, 1910.

Andria. Town and episc. see of Italy, in Bari province. It is 35 m. W. of Bari, with which a lightly connects it, and has a trade in almonds, olive oil, and majolica ware. Its cathedral, dating from the 11th century, was destroyed by fire in 1916. Pop. 60,000.

Androcles OR ANDROCLUS. A Roman slave, who is said to have lived in the 1st century A.D. He is famous for his friendship with a lion. Condemned to die in the arena, the lion sent to devour him fawned upon him, and proved to be the lion from whose paw Androcles, when hiding from his cruel master in a cave in Africa, had extracted a thorn. Androcles was forthwith pardoned and presented with the lion. The episode is mentioned in Aulus Gellius and Aelian's collection of animal stories.

Androcles and the Lion. A drama dealing with the persecution of the early Christians, written



"THE CAPTIVE ANDROMACHĒ": ONE OF THE FINEST EXAMPLES OF LORD LEIGHTON'S PAINTINGS OF CLASSICAL THEMES
Manchester Art Gallery

by Bernard Shaw. It was produced Sept. 1, 1913, at The St. James's, London, where it had a short run. The piece is an attempt to remove the halo from the first martyrs and to analyse the psychology of martyrdom, slaves of various temperaments, including Androcles, being contrasted with the brave patrician lady, Lavinia (played by Lillah McCarthy).

Andromachē. In Greek legend, wife of Hector. Homer's description of Hector's parting with his wife and infant son, Astyanax, before going to his fatal duel with Achilles is one of the finest passages in literature. After the taking of Troy, Andromachē became the captive of Neoptolemus, son of Achilles, who took her back with him to his kingdom of Epirus. She afterwards married Helenus, a brother of Hector. The sorrows of Andromachē are the subject of a tragedy by Euripides.

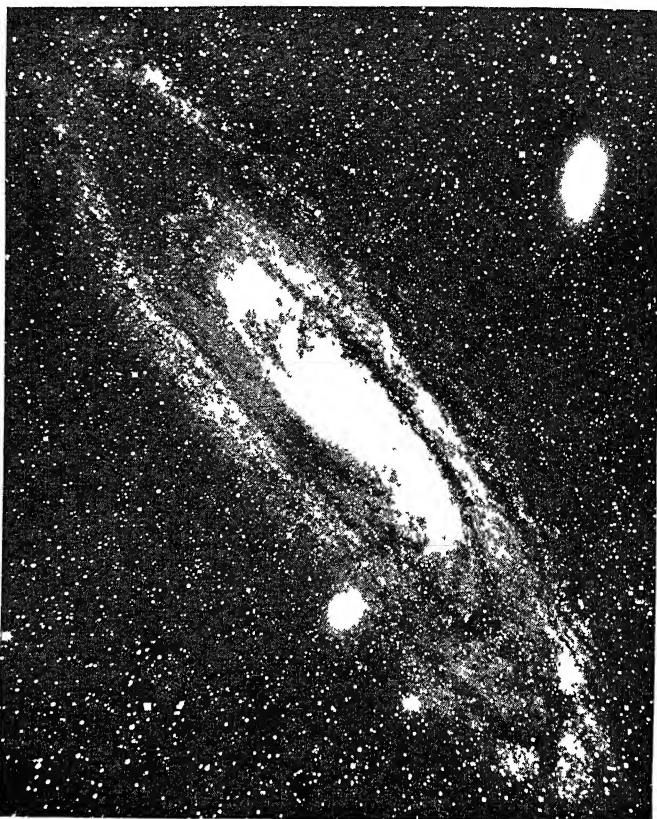
Andromeda. In Greek mythology, the daughter of Cepheus, king of Ethiopia. Her mother, Cassiopeia, having boasted that Andromeda was more beautiful than the Nereids, Poseidon, persuaded by the latter, sent a monster to ravage her country. An oracle declared that the monster could be got rid of if Andromeda were sacrificed to it, and so the unfortunate maiden was chained to a rock, to await her doom. She was saved, however, by Perseus, who turned the monster to stone by showing it the head of the Gorgon Medusa.

Andromeda. Constellation in the northern hemisphere, most readily identified in such latitudes during the autumn. It forms one of a group of constellations which preserve the legend of Perseus and Andromeda. It is easily detected by reference to the well-known Cassiopeia's

Chair. Below the Chair and slightly to the left is a group of stars which, like those of Cassiopeia, form a W in the sky, larger but less distinct than the Chair. Below this again, and to the right, is the great square of Pegasus. The extreme left star of this and the extreme right star of the large W are the Alpha and Beta of Andromeda.

Andromeda Nebula. One of the brightest and nearest spiral nebulae, of which the central region is just visible to the naked eye as a hazy patch of light half as big as the full moon. Long-exposure photographs through large telescopes show it to extend over an area 15 times that of the full moon. Until the erection of the 100-inch telescope on Mt. Wilson in California, it was not certain whether the nebula was a mass of gas in our own galaxy (like the Orion nebula) or whether it was an assemblage of stars like the sun at a much greater distance. In 1924-25, photographs on this telescope showed separate stars in the outer regions, and in 1942 a special technique using red-sensitive photographic plates showed stars even in the central regions. Variable stars in the nebula show that it is 680,000 light years from the sun, whence the larger diameter of the system is found to be 80,000 light years. It is 1,700 million times as bright as the sun, and probably contains about this number of stars, though the stars visible on photographs are intrinsically much brighter than the sun. It probably resembles fairly closely what our own galaxy looks like from outside, the plane of the flattened system corresponding to the line of the Milky Way.

Andromedids. Meteors which fall due in Nov., and follow the Leonids, which arrive earlier in the month. The point from which they appear to come, their "radiant," is visible throughout the night. They are slowly travelling meteors and their colour is yellow, which suggests that sodium may be their chief constituent. They are part of a meteoric orbit which appears to recede half-way between the orbits of Jupiter and Saturn, and their orbital period is therefore one of $6\frac{1}{2}$ years. There were notable showers in 1872, 1885, and 1892. That of Nov. 27, 1872, demonstrated that the meteor swarm was moving along the same path as the Biela comet which broke in halves in 1846 and had not been seen since 1852, when it returned still in two portions. It is almost certain, therefore, that the Andro-



Andromeda Nebula. This great spiral nebula is so immensely distant from the earth that its light takes a million years to reach us

medids, also called Bielids, are the remains of the Biela comet. Unlike the Leonid shower of the same month, which appears to be falling later, the Andromedids are advancing their date to a period earlier in Nov. See Meteors.

Andronicus I COMNENUS (c.1110-85). East Roman emperor 1183 to 1185. Grandson of Alexius I, he suffered twelve years' imprisonment for plotting against the emperor Manuel. He escaped in 1165 to Kiev, and by inducing the Russian prince Yaroslav to join in the invasion of Hungary regained Manuel's favour, 1168. A year later he was sent to govern Cilicia, but was forced into retirement after eloping with Theodora, the emperor's niece. From the death of Manuel in 1180 Andronicus, taking advantage of the disorders at Constantinople, reigned jointly with Alexius II until 1183, when the latter, a mere boy, was murdered and Andronicus therefore became sole emperor.

In less than two years he restored order in the city and brought prosperity to the empire. He reduced

the power of the nobles, and on their revolt crushed the rising. While he was absent from Constantinople Isaac Angelus, a descendant of Alexius I, roused a faction against him and was proclaimed emperor, and Andronicus, on his return, fell into the hands of his many enemies. He was tortured for three days and then slain, Sept. 12, 1185.

Andronicus II PALAEOLOGUS (c. 1260-1332). East Roman emperor, from 1282 to 1328. The son of Michael Palaeologus, whom he succeeded in 1282, he reigned jointly with his son, Michael IX, from 1295 to 1320. The two emperors defeated the Turks with the help of the Spanish adventurer Roger di Flor and his Grand Catalan Company, who eventually turned against them. On the death of Michael IX in 1325 Andronicus was forced to acknowledge his grandson, Andronicus III, as joint emperor. He abdicated in 1328 and retired to a monastery.

Andronicus III PALAEOLOGUS (c. 1296-1341). East Roman emperor 1328-41. The son of Michael

IX and grandson of Andronicus II, in 1325 he became joint emperor and in 1328 forced his grandfather to abdicate. He took Chios and parts of Acarnania, Epirus, and Thessaly, but lost most of Asia Minor to the Turks.

Androphagi (Gr. *anēr*, man; *phagein*, to eat). Tribe of man-eaters described by Herodotus as dwelling north of Scythia. Finnish nomads of savage culture, they came from the N.E. and settled in the region now called Poltava. There is no cannibal tradition in the folklore of the Mordvins, who may be ethnically their surviving representatives.

Andros OR **ANDRO**. Island of the Greek Archipelago. The most N. of the Cyclades, it is 25 m. long and 9 m. broad, mountainous, but very productive. Andros, on the E. coast, is the chief town.

Andros. Largest island of the Bahamas. It is 110 m. long and from 10 m. to 45 m. wide. Low and swampy, it is divided by lagoons into three principal and many minor parts. It is well wooded and yields woodland sponges. Pop. 6,718.

Andros, **SIR EDMUND** (1637-1714). English administrator. He was governor of the province of

New York between 1674-81. In 1678 he was knighted. In 1685 he was appointed governor of New England, where his policy of a strong central council, complete



Sir Edmund Andros, English administrator

liberty of conscience, and a strong army and navy, the former to oppose the Indians and the latter the pirates, brought him an increasing unpopularity. In April, 1689, he was suddenly arrested by the citizens of Boston, and was sent to England for trial with a committee of accusers, but was released at once without trial. As governor of Virginia, 1692-8, he founded William and Mary College. Governor of Guernsey, 1704-6, he died in London Feb. 27, 1714.

Androscoggin. River of New Hampshire and Maine, U.S.A. Issuing from lake Umbagog, it flows mainly S. about 160 m. to join the Kennebec near Bath, 15 m. from the Atlantic. It gives its name to a county in Maine.

Andro-Sphinx. Egyptian carved figure of a lion couchant with a human head. A large alabaster example, assigned to the reign of Rameses II, was dis-



Andro-Sphinx. Discovered at Memphis, Egypt, in 1912, this sculpture dates probably from about 1250 B.C. Photo, H. Fawcett

covered at Memphis by Mackay in 1912. Two andro-sphinxes from the reign of Thothmes III stand outside the Cairo museum. Several were produced by the royal workshops at Karnak.

Andujar. Town of Spain, in Jaén province. On the Guadalquivir, 48 m. by rly. E.N.E. of Cordova, it is noted for porous earthenware jars made from local white clay for keeping water cold. Pop. 18,000.

Anecdote. Term now used for a short narrative of an event in the life of a man or woman, more particularly when such narrative illustrates some peculiar characteristic of the person about whom it is told. It is in this sense that the Percy Anecdotes, by T. Byerley and J. C. Robertson, 1820-3, and J. Spence's 18th Century Anecdotes, first published 1820, are named. From the habit which certain persons have in old age of recalling trivial stories of people whom they knew in early life, De Quincey devised the word anecdote in 1823.

The word comes from Gr. *anecdota* (not published), and was originally employed to signify secret history. In this sense it was employed by Procopius for his Anecdota of the Emperor Justinian. In the sense of newly collected details it was used by L. A. Muratori, in his *Anecdota ex Ambrosianae Bibliothecae*, 1697-8, and *Anecdota Graeca*, 1709.

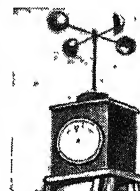
Anegada (Spanish, drowned). Northernmost isle of the Virgin Islands, British West Indies. It is of coral formation, low and flat, about 10 m. long, and very narrow. The encircling reefs are dangerous.

Aneizeh OR **ANEYSA**. Town of Nejd, Arabia. It stands on the Wadi Rummah, and is the centre of several caravan routes with considerable trade. It is renowned among Arabs as the birthplace of

Abd-ul-Wahab, the founder of the Wahabis. Pop. 10,000.

Anemochord (Gr. *anemos*, wind; *chordē*, string). A musical instrument of the harpsichord kind, played by jets of compressed air. It was invented by Johann Schnell, of Wurttemberg, in 1784, to reproduce the tones of the aeolian harp, and was played with great success by the inventor and by the German pianist Hummel. Marie Antoinette offered a large sum for it. The secret of its construction died with its discoverer.

Anemometer (Gr. *anemos*, wind; *metron*, measure). An appliance used for measuring the pressure or velocity of wind. The most common type is the Robinson anemometer. The Kew pattern of this instrument consists of four metal cups, each 9 ins. in diameter, fixed on crossbars, the distance from the centre of the cup to the centre of the axle being 24 ins. The cup type of anemometer was later largely superseded by the Dines pressure tube. The revolutions turn cog-wheels, thereby causing an indicator to move on a dial on which a scale is printed. By means of the scale the velocity of the wind may be read. Wind velocities are recorded in miles per hour, and are given in British weather reports by the Beaufort index numbers, the equivalent velocity of which is shown below. See Beaufort Scale.



Anemometer, for measuring wind velocity

Beaufort Numbers.	Wind.	Equivalent velocity in miles per hour.
0	Calm ..	0
1	Light air ..	1-3
2	Slight breeze ..	4-7
3	Gentle ..	8-12
4	Moderate ..	13-18
5	Fresh ..	19-24
6	Strong ..	25-31
7	High wind ..	32-38
8	Gale ..	39-46
9	Strong gale ..	47-54
10	Whole ..	55-63
11	Storm ..	64-75
12	Hurricane ..	Above 75

Two classes of specification are given for winds on this scale, one for use at sea, the other for use inland.

A similar instrument is used by organ builders for the measurement of wind pressure.

Anemone OR **WINDFLOWER**. A genus of perennial herbs of the family Ranunculaceae, consisting of about 70 species, generally distributed in temperate and Alpine

regions. They have thickened or tuberous rootstocks, from which the divided or lobed leaves spring direct. In spite of the fact that they have no petals, they all have handsome flowers, the sepals being large and brightly coloured.

One of the most charming species is the wild wood anemone (*A. nemorosa*), of N. Europe and



Anemone. Wood anemones (*A. nemorosa*), familiar in English coppices

N. America, that fills the woods in spring with its solitary white flowers and purple-tinged buds. The familiar garden anemones, the poppy anemone (*A. coronaria*) and the flame anemone (*A. hortensis*), are natives of the Mediterranean region, whence they were introduced into English gardens at the end of the 16th century. These have tuberous roots. The hepatica (*A. hepatica*) and the Japanese anemone (*A. japonica*), the white variety of which is so popular in gardens, have, like the wood anemone, long, fleshy, creeping rootstocks. The first of these two is wild in Europe, and the second, as its name indicates, is a native of Japan. *A. apennina*, from S. Europe, has bright blue flowers, and *A. ranunculoides*, also European, has blossoms of golden yellow, a colour rare among anemones. The pasque-flower (*A. pulsatilla*) has dull purple flowers covered outside with silky hairs. The tuberous kinds flourish in rich loam in sunny, moist positions, and hence are excellent for the rock-garden, but the herbaceous kinds need shady corners. The tubers should be planted in the autumn and the herbaceous roots in the spring.

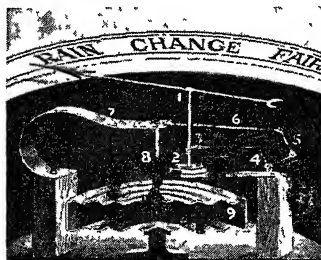
Anerley. Suburb of London. It is in Kent, and within the mun. bor. of Beckenham, $7\frac{1}{2}$ m. S. of London Bridge by railway.

Aneroid OR **ANEROID BAROMETER** (Gr. *a*, not; *nēros*, liquid; *eidos*, form). Instrument for measuring the pressure of the atmosphere. It has for its first essential a cylindrical metal box, the lid of which is a thin corrugated metal plate. The inside of this box is exhausted by means of an air pump, leaving a more or less perfect vacuum. The pressure of the outside air, therefore, forces the

thin lid inwards. As the pressure of the air varies, the bending of the lid varies, and the amount of its bending is registered through a system of delicate levers by the movement of a pointer which passes over a graduated scale.

Aneroids can be made to register variations in air pressure with extreme delicacy. One, for comparative observations of the variation of gravity at sea, consisted of a number of metal diaphragms in connexion with one another, and recorded the differing weights of the atmosphere above it at the levels of the lower and topmost decks of a ship.

Altimeters (*q.v.*), the instruments which register height in a flying aircraft, are also constructed on the aneroid principle. Sealed thin metal capsules, evacuated of air, are interconnected to increase sensitivity and accuracy. See Atmosphere.



Aneroid, showing the principle on which it works. 1. Hand turning on pivot. 2. Hair spring. 3. Chain that turns the hand. 4. Lever fixed to pivot. 5. Lever. 6. Lever rod from spring. 7. Spring pulling against the air pressure on box. 8. Rod. 9. Part of round metal vacuum box. 10. Box pressed in by increased air pressure. 11. Spring pulled down by lowered top of box. 12. Lever rod lowered. 13. Levers lowered. 14. Chain unwound by levers. 15. Hand pivot pulled round by chain

Aneurism (Greek *aneurysmos*, widening). A localised dilatation of an artery which may eventually become so extreme as to form a sac or bag communicating with the artery. The condition, much commoner in men than in women, is frequently the result of syphilitic disease of the arteries, heavy muscular work and alcoholism being contributory causes. An aneurism of the main arteries in the chest may cause serious symptoms by displacement of the heart, pressure on the lungs, and interference with the act of swallowing. Sudden death may occur from



Aneurism of the aorta pressing on the vagus nerve

rupture of an aneurism. Surgical treatment is occasionally helpful, but usually the condition is best treated by prolonged rest and by the careful avoidance of muscular effort and excess.

Anfield. A northern suburb of Liverpool, England. Included in Walton-on-the-Hill parish, it has a railway station named Walton and Anfield. The ground of Liverpool football club is in this suburb. To the S. is Stanley Park, 96 acres.

Angamos Point. Promontory of Chile, about 50 m. N. of Antofagasta. Off this cape, Oct. 8, 1879, the Chilean ironclads, Blanco Encalada and Almirante Cochrane, defeated the Peruvian battleship Huascar.

Angara. River of Siberia. It rises as the Selenga in the Klongai Mts. of Mongolia, and as the Tola in the Yablonoi Mts. of Transbaikalia, passes through Lake Baikal,

flows thence N. through Irkutsk to Tuskama, whence it follows a W. course to join the Yenisei above Yeniseisk. It is navigable to Irkutsk, and for steamers as far as its junction with the Ilim, to which point it is known also as the Upper Tunguska. The stream, usually labelled the Upper Angara, which flows into Lake Baikal at its northern extremity, is not the upper part of this great river. Part of its valley near the lake is utilised for the Trans-Siberian rly. The river is frozen for six months of the year. Its length is about 1,300 m. Gold-bearing reefs near its sources have been opened up and developed since 1920.

Angary. Term used in international law. Angaros was originally the name of the imperial Persian dispatch-riders, and angarium the system under which the transmission of dispatches was carried out. The furnishing of horses and messengers gradually



Angel. Raphael, "one of the seven holy angels which present the prayers of the saints," and Tobias. By the Italian painter Raphael
Louvre, Paris

came to be regarded as obligatory, only certain classes of citizens, such as soldiers and professors, being exempt. Later, angary was used for any kind of feudal burden or forced service, and, in the Middle Ages, for the right of a belligerent to seize neutral merchantmen and their crews for warlike purposes.

The modern definition of the right of angary (*droit d'angarie*) is "an act of the state by which foreign as well as private domestic vessels which happen to be within the jurisdiction of the state, are seized and compelled to transport soldiers, ammunition, or instruments of war; in other words, to become parties against their will to carrying on direct hostilities against a power with whom they are at peace." During the Franco-Prussian War of 1870-1, some English vessels in the Seine were sunk by Germans to prevent French war vessels from entering the river. The

plea of military necessity was set up and accepted, and the owners were compensated. The Hague regulations allow railway and other materials belonging to neutrals to be commandeered and even destroyed. During the First Great War, the Allies claimed by virtue of this custom the right to seize and make use of Dutch and other neutral vessels lying in British and American harbours.

Angas, GEORGE FIFE (1789-1879). British colonist. Born at Newcastle-on-Tyne, May 1, 1789, he made a fortune as shipowner and merchant, and in 1833 retired to Devonshire. Becoming interested in colonial development, he was appointed a commissioner under the Act of 1834 establishing the colony of South Australia, and guaranteed £35,000 to the South Australian Company for purchase of land and settlement of emigrants. Having suffered heavy

losses through his colonial agents, he himself went out to Adelaide in 1851 and spent the rest of his life in the colony, devoting to it all his energies and means. He was a founder of the National Provincial Bank of England, the Bank of South Australia, and the Union Bank of Australia. He died at Adelaide on May 15, 1879. The S. Australian township of Angaston, 51 m. by rly. N.E. of Adelaide, was named after him.

Angel (Gr. *angelos*, messenger). Spiritual being intermediate between God and man, to whom frequent reference is made in the Bible and in Babylonian and Zoroastrian literature. According to the O.T. angels were created by God (Ps. 48), and have two functions: (1) They are the messengers of God sent to guide and assist His people, the common and usual work ascribed to them. (2) They are the attendants upon God's throne, in the hierarchy of heaven. Mention is rarer in this connexion, but see Dan. 7 and Ps. 96.

In the N.T. the same functions are recorded. An angel announces to the Virgin Mary that she is to be the mother of Christ; angels are seen at the birth of Christ, and in Revelation they are described as ministering in heaven. On many occasions in the N.T. angels serve and assist Christ, as later they serve certain of the apostles. Christ refers to their good offices more than once, and in Matt. 18 alludes to them as guardian angels. While the general rule is that angels are sinless beings solely devoted to God's service, reference is also made in the Bible to fallen angels, whose function is the trial and temptation of man. Satan is referred to in Job and in Matt. 25 as the chief of these, and the dragon in Revelation may be taken as a similar example. Unlike the Zoroastrian ministers of darkness, who serve an eternal principle of evil, the fallen angels of the Bible are subject to God.

In the hierarchy of heaven four angels are named as archangels: Uriel, Michael, the warrior of Revelation, Gabriel of the Annunciation, and Raphael of the book of Tobit. Angels being creations of God, the members of the Christian church are forbidden to offer them worship due to God; but from the 4th century they have been objects of veneration. The reference to the angels of the seven churches in Revelation is variously interpreted, the most commonly accepted view being that the bishops of the churches were designated by it.

Angel. English gold coin. Struck in 1465 and known as the angel-noble, it bore a representation of the Archangel Michael slaying the dragon. It continued to be coined until the reign of Charles I. and ranged in value from 6s. 8d. to 10s. See Numismatics.



Angel. The Angel Gabriel of the Annunciation, by Melozzo da Forlì
Uffizi Gallery, Florence

Angel Fish (*Angelus squatinus*). Fish of the shark order. One species, also known as the monk fish, is common on the British coasts, especially off Scotland. It somewhat resembles a ray or skate. It is often five ft. long.

Angelica. Genus of Umbelliferae, natives of the N. temperate and sub-Arctic regions, including about 70 species. They are perennial herbs with very handsome compound leaves and large umbels of white or purplish flowers. The name indicates the former belief in the protective virtues of the plant in cases of poison, infection, and enchantment. The most powerful species from this point of view was the Archangelica (*A. archangelica*), a plant of N. Europe, the



Angel. Michael depicted by the great Italian painter Raphael
Louvre, Paris

stalks of which are candied and used as a sweetmeat.

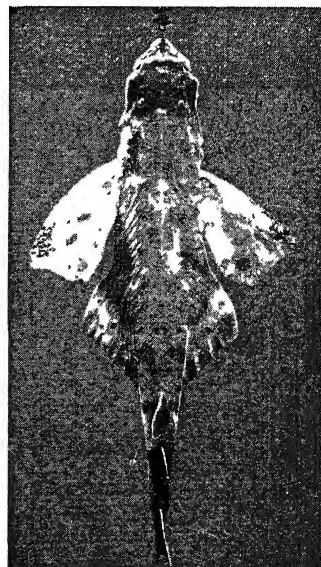
Formerly the leaf stalks were blanched and then eaten like celery. Another European species is *A. sylvestris*, which is common in damp woods and near streams throughout Britain. It attains a height of 5 ft., and has pinnate wedge-shaped leaves as much as 2 ft. long, while at the base of the leaf-stalk is a large egg-shaped expansion. The angelica tree is the popular name of a N. American shrub, *Aralia spinosa*. The berries are infused in wine or spirit to make a medicine for rheumatism, toothache, and colic. See Rice-paper plant.



Angelica

Angelico, Fra (Lat. *frater*, brother). Italian painter, in full IL BEATO FRA GIOVANNI ANGELICO DA FIESOLE (1387-1455). He was born at Castello di Vecchio, was christened Guido, and in 1407 entered the Dominican order at Fiesole, taking the name of Giovanni. Called the Angelico, on account of his sweet disposition, he passed his novitiate at Cortona. Eleven years later he

was installed at Fiesole, and in 1436 was transferred to the priory of San Marco at Florence. Here, as at Fiesole, he decorated the convent and church with frescoes. In 1445, commissioned by Pope Nicholas V to



Angel Fish. Genus of the same piscine order as the shark



Angel. English gold coin of the reign of Edward IV, slightly reduced

paint a chapel in the Vatican, he removed to Rome, where he died March 18, 1455, being buried in Santa Maria sopra Minerva.

Fra Angelico's art is remarkable for its elaborate figure composition, rich colouring, and ecstatic though simple sentiment. He had the training and instinct of an illuminator, and the precious quality of his craft is easily discernible even in his largest paintings. He is best represented at Florence, where, in addition to the San Marco frescoes, there are numerous works in the Academy and the Uffizi Gallery. Among the most celebrated of these are the Madonna of the Linen-weavers (1433), in the Uffizi, and the Deposition, the Last Judgement, and 35 small panels of the life of Christ, in the Academy. One of his early works, an altar-piece of the Virgin and Child with saints, is in the Church of S. Domenico, Cortona; others are at Rome, Orvieto, Parma, Perugia, Fiesole, and Pisa. The National Gallery, London, possesses a Resurrection, formerly the lower panel of the S. Domenico altar-piece, and the Louvre has the Coronation of the Virgin. *Consult* Lives, V. M. Crawford, 1900; L. Douglas, 1900.

Angel Inn. Former London hostelry, converted into a café in 1921. Situated at the N. end of the City Road and the corner of Pentonville Road and High Street, Islington, it was rebuilt in 1819 and 1880. One of the old posting inns, it was the first stop for those travelling northwards from London, and the original building had the customary galleries running round the yard. Here in 1790 Thomas Paine wrote *The Rights of Man*.

Angell, Sir NORMAN (b. 1874). British author. Born on Dec. 26, 1874, his full name was Ralph Norman Angell Lane. He was educated privately, in France and at Geneva. Going to western America as a youth, he was in turn prospector, rancher, and journalist. Returning to Europe in 1898 as European correspondent for several American newspapers, he settled in Paris, where he edited *Galignani's Messenger*, 1899-1903. He was general



Sir Norman Angell.
British author

manager of the *Paris Daily Mail*, 1903-14. An ardent advocate of peaceful international cooperation, he wrote as Norman Angell on this subject before and during the two Great Wars, the best known of many writings being the book entitled *The Great Illusion*, 1910, which passed through many editions in several languages. Angell was Labour M.P. for N. Bradford, 1929-31, was knighted in 1931, and received the Nobel Peace Prize in 1933. He invented *The Money Game*, a series of card games teaching the principles of elementary economics. Returning to the U.S.A., Angell became an editorial writer of *Free World*, New York, and did much other writing for the American press. Among his later publications are *America's Dilemma*, 1940, and *Let The People Know* (a statement of the British war case), 1943.

Angelo. Leading male character in Shakespeare's *Measure for Measure*. Left as his deputy by Vincentio, duke of Vienna, he revives certain laws against incontinence under which Claudio is arrested and sentenced to death. Besought by Isabella, Claudio's sister, to pardon her brother, he



ANGELICO'S VISION OF PARADISE: FROM HIS GREAT PAINTING, THE LAST JUDGEMENT
Small section of the original masterpiece in the Academy at Florence



Angelus. Millet's famous picture, painted 1859, in which the great French artist shows a French peasant couple pausing in their work in the fields to pray when they hear the ringing of the Angelus bell
Jean François Millet, Louvre, Paris

agrees to grant her request on condition that she gives herself to him. This condition having, as he thinks, been complied with, he orders the instant execution of Claudio, whose life, however, is saved by the intervention of the duke, who forces Angelo to marry Mariana, a lady whom he had discarded. See Measure for Measure.

Angelot. Old French gold coin. It was first struck by Philip VI in 1340, and had a weight of from 87 to 97 grains. The word means little angel, and the coin was so called because it bore the figure



Angelot. French gold coin of the time of Philip VI, one-third reduced

of the archangel, Michael, killing the dragon. Henry VI of England coined an angelot for his dominions in France.

Angels of Mons, THE. Popular delusion of the First Great War. During the retreat from Mons,

Aug., 1914, it was asserted that S. George, with attendant angels, interposed between the advancing Germans and the British, saving the latter from destruction. The legend arose out of an imaginative fiction written by Arthur Machen in *The Evening News* (London) and reprinted in *The Bowmen and other Legends* (Aug., 1915). Many soldiers who took part in the retreat positively asserted they had seen the heavenly company, the explanation being that owing to weariness their imaginations were not normal.

Angelus. Service in the Roman Catholic Church in honour of the Annunciation of the Virgin Mary. It is quite short, and is said three times a day—at 6 a.m., noon, and 6 p.m. The name comes from its opening sentence, *Angelus Domini nuntiavit Mariæ*. It is to announce this service, dating from the 14th century, that the angelus bell is rung in churches and convents.

Anger. Feeling of uneasiness or discomposure of the mind upon the receipt of any injury, with a present purpose of revenge (Locke). One of the sthenic or active emotions, it produces excitement and energetic muscular action. It is combined with an element of pleasure, that of looking forward to securing satisfaction for injury or injustice. Anger may be caused by contemptuous treatment, by impediments to the accomplishment of our wishes, or by actual wrong. Wounded self-love is generally its prime cause. Bain's opinion that the chief element of deliberate



Angel Inn, Islington. Courtyard of the old hostelry
From an old print

anger is the impulse to inflict suffering upon another in order to gratify oneself seems extreme.

Angerman. River of Sweden. Rising near the Norwegian border, it flows S.E. and enters the Gulf of Bothnia through a long estuary N. of Hernösand. Its length, including the headstream and some lakes, is 242 m. The river is used for floating timber from the extensive forests through which it flows. With its tributaries it drains 12,600 sq. m., and it is navigable by small craft for about 70 m.

Angers. City of France, formerly the capital of the duchy and prov. of Anjou. Standing on the Maine, a few miles above its junction with the Loire, 212 m. by rly. S.W. of Paris, it is the chief town of the department of Maine-et-Loire. Here the rivers Sarthe and Mayenne meet to form the Maine, and the town is a natural converging point of roads and railways. Around the ancient town lie new and spacious suburbs. Its commercial prosperity is due to its position in a fertile district where abundant vegetables, fruit, and

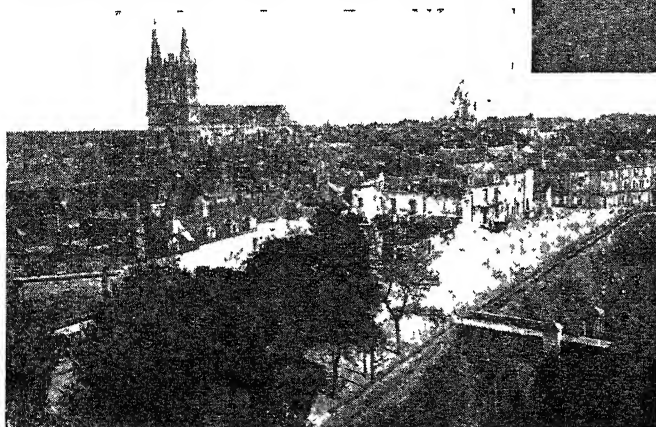
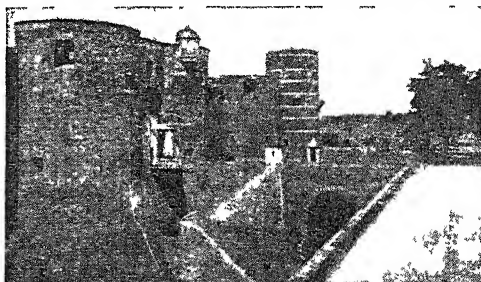
some picturesque old houses and an episcopal palace; its modern buildings include the palais de justice and a hospital. The ancient Andegavum, its early importance began when it became the residence of the counts, afterwards dukes, of Anjou. Until the Revolution it had a famous university. Pop. 87,988.

From Nov., 1939, to June, 1940, Angers was the seat of the refugee Polish government. The city was bombed by Allied aircraft on June 3, 1944, and liberated by U.S. troops on Aug. 11, 1944.

Angerstein, JOHN JULIUS (1735-1823). Russo-British art connoisseur. Born at St. Petersburg of Russian descent, he came to London in 1749. He amassed a fortune which he spent in philanthropy and on a remarkable art collection. After his death at Blackheath, Jan. 22, 1823, on the advice of Sir Thomas Law-

Angevin, being another grandson of Edward III, is more usually regarded as the first king of the house of Lancaster. These Angevin kings are generally known as Plantagenets. See Plantagenet.

Angilbert (d. 814). A French saint and poet. He was educated at the court of Charlemagne, where, under Alcuin, he studied Latin and Greek. He became count of the palace to Pepin when that prince was crowned king of Italy in 782. Returning to France, he fell in love with Charlemagne's unmarried daughter, Bertha, and became by her the father of two children, one of whom was the chronicler Nithard. In 790, on the advice of Alcuin, then abbot of Tours, and with the consent



Angers, capital of the old French province of Anjou General view of the city as seen from the castle. Above: Entry to the castle

flowers are grown, to the small coal mines and slate quarries close by, and to manufactures of liqueurs, wine, and clothing.

Angers has been the seat of a bishop since the 3rd century, and its cathedral, dedicated to S. Maurice, was built in the 12th and 13th centuries, and added to in the 16th. S. Serge's is another old and interesting church. The castle, formerly a stronghold of the dukes and now an armoury, is a fine example of its kind, and dates from the 13th century. The Hôtel d'Anjou dates from three centuries later. In the city are the medieval abbey of S. Aubin and hospital of S. John. Angers has

rency and other connoisseurs the Government asked for and obtained a grant of £60,000 for the purchase of his pictures, and they formed the nucleus around which have grown the treasures in the National Gallery (*q.v.*).

Angevins. A family to which eight of the English kings belonged. Henry II of England was the son of Geoffrey, count of Anjou, and he himself became count in 1151. These counts are, therefore, known as Angevins, Henry and his descendants on the English throne, of whom Richard II was the last, being often called the Angevin kings. His successor, Henry IV, also an

of Charlemagne and Bertha, he became abbot of Centula, later known as S. Riquier, in Picardy. He rebuilt the abbey and endowed it with a library. He was three times sent as envoy to the pope. He died Feb. 19, 814, and by popular and unofficial canonisation figures in the calendar of saints. It is doubtful if he is the author of a fragment of an epic dealing with Charlemagne and Leo III, attributed to him, but he probably composed portions of the *Annales Laurisenses*.

Angina Pectoris (Lat. *angina*, choking; *pectoris*, of the breast). Severe paroxysmal pain in the heart. It is not an independent disease, but a symptom of various abnormal conditions of the heart, particularly those associated with degenerative changes in the coronary arteries supplying the heart, or in the great main blood-vessel termed the aorta.

Angina pectoris is a disease of adult life, and much more frequent in men than in women. The chief causes are syphilitic disease of the arteries, gout, and diabetes, and less frequently influenza. The pain comes on suddenly, usually in consequence of muscular effort or strong emotion, such as a fit of anger. Dyspepsia and sudden exposure to cold in bathing or getting out of bed are other exciting

causes. The pain is described as feeling as though the heart was held in a vice, and it radiates into the neck and down the arm. The face is pale and the body may be covered with sweat. The paroxysm lasts from a few seconds to a minute or two, and during the height of the attack the patient may faint or drop dead. Inhalation of nitrite of amyl is often of great value in relieving the pain. There is no known method of curing the condition, but by leading a quiet life and avoiding muscular effort and excitement the frequency of the attacks can be reduced.

Pseudo-angina, or false angina pectoris, is a condition of paroxysmal pain in the heart which is often mistaken for the true form, but is much less serious. It occurs most often in women and is usually an indication of neurasthenia or hysteria. It may be distinguished from the true angina pectoris by the attacks being less severe and often periodical and occurring at night, by the pain coming on without muscular effort and lasting for perhaps one or two hours, and also by the indications of other disturbance of the nervous system. Pseudo-angina is never fatal. The treatment of the condition is the same as for other forms of neurasthenia. A very similar pain in the heart may arise from excessive indulgence in tobacco, tea, coffee, and other stimulants. This form is sometimes termed toxic angina. See Heart.

Angiosperms (Greek *angeion*, vessel, *sperma*, seed). One of the two sub-classes of seed-bearing plants (Spermatophytes). It embraces all those natural orders whose seeds are produced in a seed vessel, as opposed to gymnosperms, whose seeds are naked.



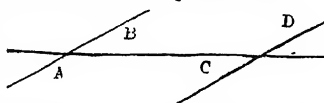
Angiosperm.
Horse-chestnut

Angkor or **NAGARA THOM**. Ruined city and the ancient capital of Cambodia. It stands on the Siem-Reap, to the N. of the Tonle Sap or Great Lake. Enclosed by walls 30 ft. high, it covers an area 2 m. square, has five splendidly wrought gates, and also contains remains of some royal palaces and several temples. To the S. is the temple of Angkor Vat, a wonderful building where Brahma and later Buddha were worshipped. One of the finest remaining examples of Khmer architecture, it stands in a moated park and according to Aymeria dates from the opening half of the 12th century.

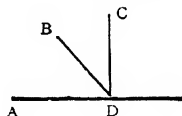
Angle (Lat. *angulus*, corner). In the simplest terms, the point where two lines meet, or the line where two surfaces meet. The point of meeting is called the vertex, and when meeting lines are under consideration, the figure formed by the lines emanating from the vertex is the angle.

In the strict mathematical sense, the angle is the measurement of the amount of rotation which would be necessary to make one of the lines coincide with the other. The amount is usually expressed in degrees. When one line is perpendicular to another the number of degrees between them is 90 and the angle is called a right angle. If the angle is less than this it is called an acute angle; if greater, an obtuse angle.

Alternate angles are formed when a line crosses two parallel lines:



Here the angle at A and the angle at D are alternate angles, as are also the angles at B and at C. Complementary angles are those which make up a right angle, e.g. the angle A D B and the angle



B D C. The term "angle of parallelism" is used in non-Euclidean geometry to denote the angle made by one parallel with a transversal which is at right angles to the other parallel.

A polyhedral angle is a solid angle formed by the meeting of more than three planes. A trihedral angle, as in a triangle pyramid, is one made by the meeting of three planes. A solid angle, in more general terms, is the figure formed by plane or curved surfaces passing through a point and intersecting a plane not containing the point in a closed curve or broken line. See Geometry.

In optics, the angle of incidence is the angle between the line of a ray of light striking a surface and a perpendicular drawn at the point where the ray strikes the surface. The angle of reflection is the angle between the direction of the ray reflected from a surface and the perpendicular. The angle of refraction is the angle between the line which a ray of light takes when it is bent in passing from one medium to another, and the

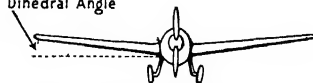
perpendicular to the surface of separation of the two media. See Mathematics.

Angle. In aeronautics, a number of factors related to angles are of fundamental importance in designing aircraft and also to the performance of the machine and the manner in which it is controlled by the pilot. One of these is the angle of incidence. This is the angle at which the wings are attached to the fuselage or body of an aircraft, the measurement being taken between the longitudinal axis of the machine and the chord line of the wing. The chord line is the imaginary line drawn from the leading edge to the trailing edge of the wing. As the wing is progressively inclined from the edge-on position to the airflow, it experiences an increasing normal pressure and thus the amount of lift produced varies. For slow flying, a comparatively large angle is required. When the aim is high speed, a small angle of incidence is necessary.

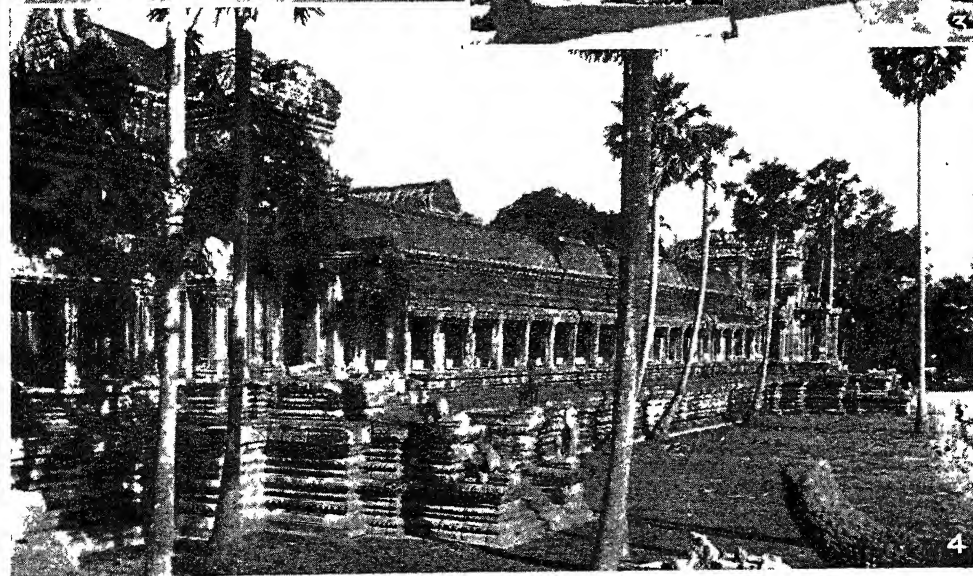
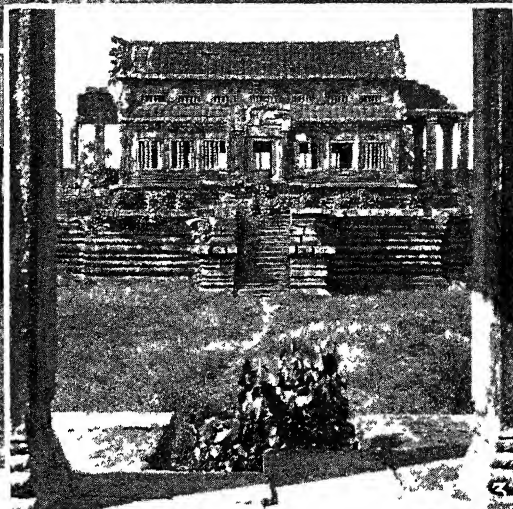
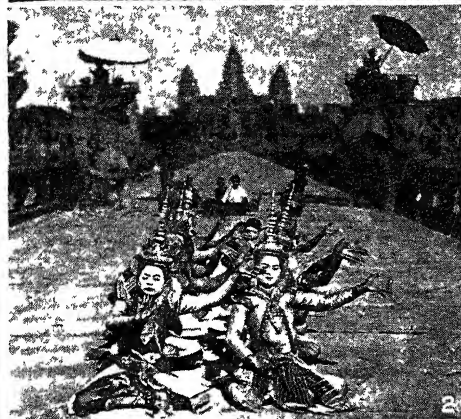
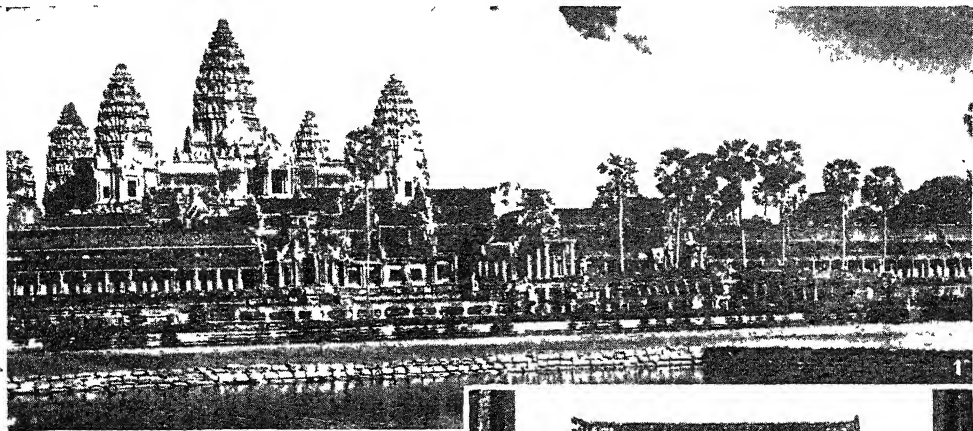
The angle of attack is the angle at which the airflow meets the aerofoil, i.e. the wing of an aircraft. The effect of this is twofold. The airflow forces the wing upward and at the same time induces a backward pressure. The former is known as lift, the latter as drag. The relationship of these two forces is termed the lift/drag ratio and its variation depends on the angle of attack.

When the wings of an aircraft are attached to the fuselage so that they are inclined at an upward angle in relation to the centre line of the aircraft, the angle so formed is termed the dihedral angle. Wings are arranged in this way to provide stability in the rolling plane and so to relieve the pilot of the task of correcting the attitude of the machine when it is violently tilted by air disturbances during flight. When it is tilted over sideways by any cause the wing which drops assumes an angle of attack which is greater than that of the upper wing. The lift therefore becomes greater, and so the wing rises and the aircraft is restored to its normal level flying attitude. The dihedral angle is usually between 2° and 7°. See Dihedral.

Dihedral Angle



Angle. Diagram showing the dihedral angle of an aeroplane

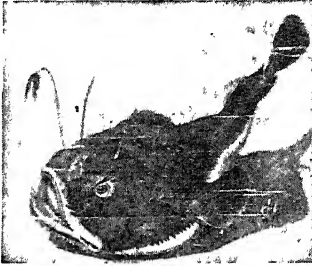


1. General view of the massive and profusely ornamented ruins of the temple. It was built in the 7th cent. of multi-coloured sandstone, and was used for Hindu worship before being finally consecrated to Buddhism.

2. Girl dancers, attached to the temple ritual, on one of four great stone causeways. 3. The library. 4. One of the interior courtyards, showing colonnades in the form of cloisters. The outer walls enclose 400 acres

ANGKOR VAT: IMMENSE KHMER TEMPLE IN THE HEART OF THE CAMBODIAN JUNGLE

Angler Fish (*Lophius piscatorius*) A fish of the order of Teleostei, or bony fishes. Common around the British coasts, it ranges in length from 3 ft. to 5 ft., and is known also as the sea devil,



Angler fish One of the bony fishes common round the British coast

the fishing frog, and the gab. It is dark brown on the upper surface and white beneath, but the nature of the sea bottom modifies its colour considerably. Extremely ugly and awkward in movement, it usually lurks in the weeds by the shore, where it can walk along the bottom by means of its paired fins. Its conspicuous feature is its enormous head. It has a huge mouth, with backward-pointed teeth, and a series of fringed tentacles or appendages above the mouth and on the body. It derives its name from lying in wait on the sand or mud, with the bones of the first back fin stalks waving like fronds of seaweed. These attract small fish, which are promptly snapped up. Other species inhabit deep water, and in these the fringed tip of the main head rod is phosphorescent.

Angles. Name of the tribe which gave its name to England or Angleland. Of Teutonic stock, the Angles lived in the district of Slesvig-Holstein known as Angeln. In the 5th century they invaded England. They settled in East Anglia, and, according to Bede, founded the kingdoms of Mercia, Deira, and Bernicia. See England: History.

Anglesey or **ANGLESEA.** Island and county of North Wales. It has a length of 21 m., a breadth of 28 m., and an area of 275 sq. m. Menai Strait, which is spanned by the Menai Suspension Bridge and the Britannia Suspension Bridge, separates it from the mainland of Wales.

Anglesey has generally a flat, unpicturesque surface, relieved by

slight hills, the highest point being Holyhead Hill, over 700 ft., a fertile well-cultivated soil, and a mild climate. Minerals are plentiful. Copper is extensively worked at the Parys and Mona mines, near Amlwch, and zinc, limestone, lead ore, marble (the green serpentine of Holyhead Island), coal, granite, and soapstone are found. Agriculture and

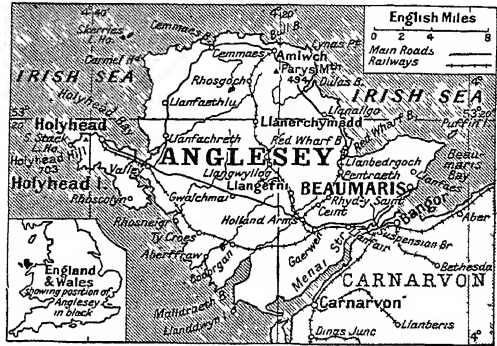
cattle-rearing receive considerable attention, but there is little manufacturing. Beaumaris is the county town, but Holyhead, the port for mail steamers to Dublin, situated in the extreme W. on Holyhead Island, is more important. There is a B.B.C. transmitter a few miles to the N.E. of Beaumaris. The co. is served by British Rlys. One member is returned to Parliament. The pop. at the census of 1931 was 49,029.

The Mona of Tacitus, Anglesey was then a stronghold of the Druids, and was subjugated by the Romans A.D. 61 and 78, and finally, in 1272, by Edward I, who built Beaumaris Castle. Ancient remains abound; Holyhead has remnants of a Roman camp. Off the E. coast is Puffin Island, the scene of the wreck of the Rothesay Castle, 1831. See Druids.

Anglesey, EARL AND MARQUESS of English titles held in turn by the two families of Annesley and Paget. In 1661 Arthur Annesley, Viscount Valentia, was made earl of Anglesey, a reward for his services in helping to restore Charles II. His son James succeeded him, and the title passed to his descendants

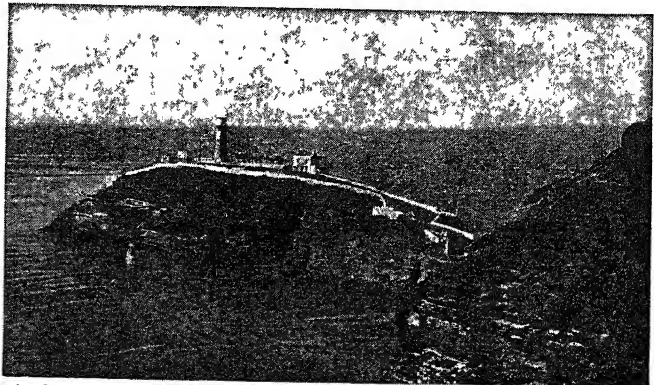
until Richard, the 6th earl, died in 1761. Richard left a son Arthur, but there was some doubt about his paternity and the English House of Lords would not allow him to succeed. The Irish House held a contrary opinion, and he became Viscount Valentia and afterwards earl of Mountnorris.

William Paget, a Londoner, was secretary of state under Henry



Anglesey. Island county off the coast of N Wales it was the last stronghold of the British Druids

VIII and Edward VI, and was made a peer as Lord Paget of Beaudeston in 1552. He obtained extensive lands in Staffordshire, but his fortunes in later years were somewhat chequered. The barony passed to his descendants, of whom William, the 6th lord, was a supporter of William of Orange and later an active diplomatist. The 7th lord was made earl of Uxbridge in 1714, but this title became extinct when his grandson died in 1769. The barony, however, passed to a cousin, who was made earl of Uxbridge in 1784. His son, the famous cavalry officer at Waterloo, and later lord-lieutenant of Ireland, became 1st marquess of Anglesey in 1815, and the title is still held by his descendants. The 5th marquess was notorious



Anglesey. The South Stack lighthouse off Holyhead Island, the most westerly point of the county. The port of Holyhead is on this island



Anglesey arms

for his eccentricities and extravagance. George (b. 1922), 7th marquess, succeeded 1947. An eldest son is called earl of Uxbridge, and the family seat is Plas Newydd, Anglesey. *See* Paget.

Anglesey, ARTHUR ANNESLEY, EARL OF (1614–86). English politician. Son of Sir Francis Annesley, afterwards Lord Mountnorris, he was born at Dublin, July 10, 1614, and was educated at Magdalen College, Oxford. After twice acting as parliamentary commissioner in Ireland, in 1645 and 1647, he sat for Dublin city in Richard Cromwell's parliament, 1658, and for Carmarthen borough in the Convention parliament, 1660. In 1661 he was made earl of Anglesey. He was vice-treasurer and receiver-general for Ireland 1660–7, when he became treasurer of the navy. In 1672 Anglesey was made lord privy seal, but ten years later was dismissed for criticising the Government. He exercised a moderating influence at the Restoration, and showed courage and independence in resisting the so-called popish plot in 1680. He died April 26, 1686.

Anglesey, HENRY WILLIAM PAGET, 1st MARQUESS OF (1768–1854). A British soldier and statesman. He was the eldest son of the 1st earl of Uxbridge, was educated at Westminster and Christ Church, Oxford, and after sitting in the House of Commons 1790–6



Lawrence
Portrait, Sir T. Lawrence

and 1806–12, he succeeded his father as earl of Uxbridge in 1812. He served in Flanders in 1794 and with marked distinction under Sir John Moore in Spain. In command of the British cavalry through the Waterloo campaign, 1815, he lost a leg in the memorable charge on June 18, and was made marquess of Anglesey. In 1828 Anglesey was appointed lord-lieutenant of Ireland, but for his support of Catholic emancipation was recalled by Wellington, to be reappointed by Grey in 1830. He left Ireland in 1833 after setting up the Board of Education. From 1846–52 he was master-general of the ordnance in the Whig ministry. He died, a field-marshal, April 29, 1854, and was buried in Lichfield cathedral. One of his sons, Lord George Paget (1818–80), was a cavalry leader in the Crimean War

Anglesite. Mineral found in many lead regions. A sulphate of lead ($PbSO_4$), it is insoluble in water, but soluble in acids, potash, and other alkaline solutions. It occurs in a massive form of granular structure, white and rather soft, and also in the form of crystals mostly transparent and without colour, but sometimes softly coloured grey, green, blue, or yellow. Anglesite contributes something to the world's supply of lead, but it nowhere occurs in

sufficient quantities to be used by itself as a source of that metal. It gets its name from having been originally discovered in Anglesey (1832) *See* Lead

Anglican Chant. Derivative of the Plain Song or Gregorian Chant. Its distinguishing features are (1) definite accents and note values: and (2) harmony. A single chant has two sections, of three and four bars respectively; a double chant is of the form and length of two single chants *See* Gregorian Chant.

ANGLICANISM : HISTORY & PRINCIPLES

The Very Rev. S. C. Carpenter, D.D., Dean of Exeter

This article deals with the development of Anglicanism as a broad principle of religious belief and practice both in England and in other countries. For details of its organization in England, see Church of England

Anglicanism is properly a temper of mind, a spirit, a thing which cannot be counted, weighed, or measured. Nevertheless, spirit in this world always takes to itself form. Accordingly, the nature of Anglicanism can be diagnosed from the history of the Church of England, and, since the Reformation, of that larger body, the Anglican Communion.

Anglicanism has existed for a long time, and has continued to flourish in the face of considerable difficulties. The difficulty at first was the pressure exercised by Rome. The difficulty since the Reformation has been the pressure of the State.

The story begins with the conversion of the English in the seventh century. That came from two quarters, from Rome and from the North West. Early English Christianity was a very fine thing. It tamed a very rough and barbarous people, it bred some great saints, and it was missionary-hearted. Moreover, it united the nation. There was one church of the English while there were still seven English kings, and there were English church synods before there was an English parliament. The weakness of the Church of England at that time was that it was isolated, especially the Northern half of it.

The Norman conquest, hard as it was for Englishmen to bear, had the salutary effect of "continentalising" the Church of England afresh. William I refused to do homage to the Pope for his kingdom, but he brought in much of the culture of the Continent. At the same time he gave the Church a considerable measure of independence by creating ecclesiastical courts side by side with

his own secular courts. Thomas Becket, taking advantage of this, stood out as a champion of the rights of the clergy against Henry II, but he was felt by the common people to be their champion too. Fifty years later, the Great Charter, which the barons, headed by the archbishop, wrung out of King John, threw the Church once more into the arms of the Papacy, but that was only because there was at that time nothing else.

From the beginning of the 13th century, especially under the weaker kings, like Henry III and Henry VI, the papal power in England increased. The stronger monarchs, like Edward I and Edward III, resisted the process. Statutes were passed forbidding appeals to Rome from the King's Court and papal nominations to English benefices. And all the time everybody protested against papal financial exactions. That was where the shoe pinched every foot. The fact is that the Church of England, remaining in communion with the Pope, and for centuries not dreaming that anything else was possible, had all the time a character of its own. It developed a good deal of the sort of thing which in the French Church was afterwards called Gallicanism. In England it was Anglicanism.

The Reformation was, among other things, an upspringing of nationalism. It was, of course, much else besides. There were theological and ecclesiastical discontents which had been brewing for centuries. The actual course of events was largely engineered by monarchs, but not even Tudor monarchs could act effectively except where there was some public

opinion to support them. There was a general desire for simplification in belief and practice, and an eagerness to use the New Learning and the English Bible. Continuity was taken for granted. No one supposed for a moment that a new church was being created, and there is no vestige of a date at which it could be alleged that this was done. Care was in fact taken that the old Bible, the old creeds, the old sacraments, should continue to be used, and that the episcopal succession should be maintained. But what chiefly happened was that the Church of England rose up and said: "We will have our own form of the Christian religion." The Reformation took a long time. It began under Henry VIII, and it ended with the Book of Common Prayer in 1662.

Non-Jurors and Nonconformists

The Book of Common Prayer represents the victory of the Church and King party over the Puritans. The Prayer Book system never had a chance to take root everywhere. It assumed that there would be small parishes, and that all the parishioners would be baptized, confirmed, and communicants. This did not happen. The Puritans went out, and non-conformity, in the modern sense, began. A little later nine bishops, including five of the famous seven who had resisted the tyranny of James II, about 400 priests, and with them a number of the laity, felt that they could not suddenly transfer their sworn allegiance from King James to King William. They were the non-jurors. They were not Jacobites. They made no attempt to restore the Stuarts. But they refused the new oath, and were accordingly deprived and went out into private life. Their departure was a loss to the Church. Later still "the people called Methodists" gradually drifted away from the Church, and with the Industrial Revolution and the development of large urban populations, a generation grew up of whom many knew nothing of either church or chapel. Thus the Prayer Book did not obtain the universal acceptance its compilers expected.

From 1688, except for a brief period under Queen Anne, it was the policy of the government to ensure that the bishops and other State-appointed clergymen were of sound Whig principles, and in the 18th century the Church, with her Convocations forbidden to transact any business, and her leaders all cut to a State pattern, sank into inertia.

Then came four great revivals, the Evangelical movement, which was a recovery of personal religion, the Oxford or Catholic movement, which was a reassertion of the corporate idea of the Church, the liberal movement, which taught people to think about their religion, and a movement, of which Maurice and Kingsley were among the leaders, which emphasised the social implications of belief in Christ. The Church of England has been able to absorb these movements to such an extent that every Anglican in the world today is affected for the better by all four of them.

Anglicanism Overseas

The Anglican Communion is something very much larger than the Church of England. Anglicanism since the Reformation has existed in Scotland, in Ireland, and in Wales, as well as in England. In these countries it is now "disestablished." That fact, of course, makes no difference whatever to its spiritual *ethos*.

Elsewhere it has grown to very large dimensions. The earliest English missionaries, like Boniface in Germany, had no thought of planting anything specifically English. But the Elizabethan explorers, like Raleigh in Virginia, planted a part of the Anglican Communion, with the English Prayer Book, and from that grew up what is called the Protestant Episcopal Church of America. During the 18th century the American colonists were, by the obstinate action of the home government, without bishops; but in 1784 Samuel Seabury was consecrated at Aberdeen to be bishop of Connecticut, and there are now more than 100 bishops of the American Church. The American Church is, of course, completely self-governing, as are the Churches of the Dominions (Canada, Australia, New Zealand, South Africa, and, rather less completely, India), but it is their pride and pleasure to send their bishops every ten years to the Lambeth Conference, which sits under the presidency of the archbishop of Canterbury.

The Churches of the Dominions were all at one time "established" and were in fact legally parts of the Church of England. When Bishop Selwyn of New Zealand held a perfectly innocent synod of his few clergy, grave fears were entertained that he was contravening a statute of Henry VIII! All this has passed completely away. It proves that Anglicanism is independent of State establish-

ment. In England the Church happens to be established—or, more correctly, the State has an ecclesiastical connexion—a condition of affairs which is an advantage to the nation and a burden to the Church. Overseas there is no State connexion.

There are also large numbers of missionary dioceses. The work of the Society for the Propagation of the Gospel, the Church Missionary Society, the Universities Mission to Central Africa, and other agencies has planted the Church in all parts of the world. The missionary dioceses are not yet self-supporting, either in workers or in finance, but they are being more and more staffed by native-born clergy and teachers, and they are all developing a character of their own. The policy of the missionary dioceses is not to import into the new country all the traditional furniture of home Anglicanism, but to plant the four essential things, the Bible, the Creed, the sacraments, and the ministry, and to promote the growth of the new Church on natural and native lines. The architecture, the music, the parochial organization of a Church where Indian Christians worship should all be as completely Indian as their language.

The Anglican Principle

The life of Anglicanism overseas has hitherto been affected by the fact that the Anglicans are often of English origin. Even in the U.S.A. a large number of the Anglicans are those whose forebears came from England. But everywhere Anglicanism is resting less and less on accidents of this kind, and more and more on principle. It is a fatal mistake for the traveller to Canada, the U.S.A., or Scotland to speak of the "English" Church. It may in fact include a few English people who have gone to live in the country in question, but it is not the "English" Church. "Anglican" is a proper term, because that signifies a principle.

What is the principle? What is the spirit that indwells in this body? Its classical exposition is to be found in the pages of the Elizabethan Richard Hooker. Living at a time when the old medieval text-books had been laid aside, and in some quarters were being replaced by a Calvinism which was coming from Geneva, he began again at the beginning, and worked out what may be called an Anglican interpretation of Christianity. It was neither Papal

nor Puritan. It was, in fact, a new experiment in religion.

There were at the time of the Reformation two quite simple things that could be done. It was possible to pursue the old paths and to dismiss the reformers as rebels against divinely sanctioned authority. It was possible also to fling tradition to the winds and start afresh. These two courses were simple and straightforward. They were adopted in the main at Rome and at Geneva. Rome went on being papal, and Calvinism was a new church.

The Church of England adopted a policy which its enemies call compromise and its friends call comprehensiveness. It remained faithful to what it conceived to be the fundamental things, and it tried to be open-eyed towards new knowledge, to be both Catholic and Reformed.

The result is that Anglicanism, both at home and overseas, has always had a more ragged margin than is observable elsewhere. There are eager spirits who say: "Let us be definite." Others, however (and this is the characteristically Anglican position), say: "We are a part of Western Christendom, and of the whole Catholic Church, East and West. We are also Reformed. Let us therefore work for the reunion of Christendom all round. And in the meantime let us be realists. Let us remember that there are many English people who are friendly to the Christian cause, but have not yet come all the way. Let us try to meet them where they stand. Let us use the ordered beauty of our liturgy. Let us proclaim the highest possible ideal for all who are able to receive it. For those who are not yet ready, let us provide whatever they will take—street-preaching, parochial visiting, Christian Evidences in Hyde Park on Sunday afternoon, the parish magazine, schools, music, drama, the films, broadcasting, volumes of philosophy, journalism, tracts, lectures, Padres' Hours—anything that will bring men and women one step nearer God." That is Anglicanism.

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ANGLING: FISHING WITH ROD AND LINE

Walter M. Gallichan, Author of *The Complete Fisherman*

General information concerning angling—what it is and how it is carried on—is given here, also some particulars of the more notable branches into which the sport is divided. See also articles on Salmon Fishing, Trout Fishing, Fishing Rod; etc.

Angling, from the A.S. *angel*, a hook, is the art of catching fish with rod, line, and hook, more particularly that branch of fishing which requires delicate manipulation of an artificial or natural bait. The term is specially used to denote the capture of fish as a sport and a means of recreation rather than as a commercial undertaking. Angling was doubtless practised with rude methods by primitive man all over the world, generally in order to obtain food, and it was certainly known to the ancient Egyptians, Greeks, and Romans.

Angling as a sport has several branches. The capture of salmon, sea trout, and river, or brown, trout with the artificial fly is considered the highest form of the art of fishing. General fish or "coarse fish," as distinguished from the "game fish" of the salmon family, are taken by bait-fishing in mid-water or on the bottom, and in the case of pike by spinning or trolling a natural or artificial lure. The principal fish now included under the category of "general," and frequenting rivers, lakes, or ponds, are pike, perch, carp, bream, tench, rudd, roach, chub, eels, and gudgeon. Barbel are only found in flowing water, and dace do not thrive, as a rule, in lakes. Chub occasionally resort to still water, but they prefer streams.

MODERN ANGLING METHODS. Pike are caught by spinning and live-baiting. The first mode is considered the more "sporting," provided that the bait is cast from the rod, and not trailed or trolled behind a moving boat.

Varieties of Artificial Baits

Skill in casting a spinning bait requires much practice. The newest reels are constructed with a free running mechanism, which enables the fisherman to cast from the reel itself by a swinging movement of the rod. These reels are of various makes, and are provided with checks, which are applied when the fish is hooked. The least expensive are the Nottingham wooden reels, fitted with optional checks and line guards. Among the reliable chonite and aluminium spinning reels are the Allcock-Aerial, the Coxon, the Britannia, and the Schooling.

The spinning baits employed in pike fishing are numerous. One of the oldest, but still popular, is

the spoon-bait of various sizes. A modified form is known as Geen's phantom spoon. Among the newest artificial baits are the Spiral, the Perfect, the Water-Witch, the Wagtail, and the Chase-Mc. Some anglers use silk or rubber baits, resembling small fish, and of these there are several varieties. Light celluloid spinners are preferred by some, and the Devon minnows or Kill-Devils are popular. Pike rods are usually from 9½ ft. to 12 ft. in length. A rod of 10 ft. is useful for general pike fishing; the best kinds are made of split cane, or whole cane with lancewood or greenheart tops. The Jardine and the Ideal are useful combination rods for live-baiting or spinning. A light rod, in two joints, is the Perfect, obtainable in two lengths, 7½ ft. or 9½ ft.

Angling for Pike and Roach

Pike lines should be fairly strong. The length should be not less than 70 yds. Traces of gut, with revolving swivels attached, must be used in spinning. For live-baiting, a single hook thrust through the lips of a small fish (dace, roach, or gudgeon) must be used, or the triangle hooks known as "snap-tackle." A length of gut of moderate stoutness, with a weight at the bottom, and fitted with a single large hook, is called a paternoster, and this is a useful tackle for pike fishing in weedy waters. With a running live-bait the snap-tackle is mostly in use, and the bait is kept about mid-water by a large cork float.

Pike are predatory fish, and will seize any kind of small prey. In spinning, a natural bait, mounted on a proper trace and hooks, is generally more alluring than an artificial bait. Live-baits must be kept fresh and lively in a bait-can. An ordinary live-bait is a dace or gudgeon of about 5 ins. or 6 ins. in length. The season for pike is from the end of September to the end of February.

Roach fishing is a very popular pastime. Most town anglers are chiefly roach specialists, and the methods of angling are becoming finer and more subtle. Some fishermen use a roach pole, a long rod made of bamboo in several joints, and angle with very fine tackle, a small hook, and bread paste, gentles, or soaked wheat as bait. Another way is Nottingham fishing, in which a 10-ft. or

12-ft. rod is used with a running line, a fine cast, and a goose quill or porcupine float. By this mode a long swim can be fished by paying out the line from the reel as the float sails down with the current. Roach feed on or near the bottom, and before fishing the depth must be ascertained by a plummet. In most waters roach may be drawn to a feeding place by a ground-bait of soaked bran, a mixture of bran and bread, stewed wheat or barley, or brewer's grains. A few handfuls should be thrown into likely places some hours before fishing.

Bream, Chub, Perch, etc.

Roach will take a red worm or the tail of a lobworm, when the river is discoloured. Some anglers prefer gentles as a summer bait and worms in winter. A very popular bait at present is a small cube of bread-crust. Roach occasionally grow to 3 lb. in weight, but a fish of half that weight is esteemed. In many lakes and streams the average weight is $\frac{1}{2}$ lb.

Carp, which are shy feeders, mostly frequent old ponds. They attain the weight of 20 lb. in some waters, and are frequently taken up to 10 lb. The tackle for carp must be stouter than that for roach fishing. Among the chief baits are bread paste sweetened with honey, gentles, and lobworms.

Tench feed on the bottom, and may be caught in some rivers of a sluggish character, in canals, and in ponds. Their feeding habits are uncertain, but they may be drawn into a shoal by the liberal use of worms as ground-bait.

Bream grow to about 10 lb., and specimens of 7 lb. are not uncommon. They are caught in the same manner as roach, but a rather larger hook is used, and the bait should touch, or trail upon, the bed of the river. Ground-baiting is necessary—and this may be stewed wheat, boiled rice, or a mixture of both. Bream feed most freely in the height of summer.

Chub may be enticed with a fly on, or just below, the surface, or with gentles, worms, cherries, blackberries, boiled shrimps, or cheese paste. These fish will take a live cockchafer, beetle, or blue-bottle, if presented to them without the shadow of the angler falling on the water. Fishing for chub with Nottingham tackle in the winter often gives good sport. A little ground-bait may be cast now and again into the swims.

Dace will take an artificial fly in the summer months, and in winter they often feed on gentles or small worms. Fine roach tackle should be used for this fishing.

Barbel have been captured up to 15 lb. They resort to sharp streams, or deep holes near weirs, and are only taken at certain times, and after liberal ground-baiting. The usual manner of angling is with a leger, i.e. a yard of gut with a worm-hook attached. Above the knot of the reel line is a bored bullet, which sinks to the bottom. A bite is indicated by a jerk of the line.

Perch afford good sport in both summer and winter. They frequent weedy waters, the roots of trees, and the clay banks of rivers. They may be enticed with a live minnow on a paternoster or float tackle, or with worms, and occasionally with small spinning baits. They are sometimes voracious during a thaw. Worms may be used as ground-bait in either rivers or lakes.

Rudd are not very generally distributed, but they abound in eastern England, and in some pools in the south and Midlands. The methods of angling are the same as for roach. Rudd are most lively in warm months, when they often rise to the fly.

Gudgeon are voracious little fish, which take red worms freely in the summer months. The bait should touch the bottom.

The General Fisherman's Outfit

The outfit for the general fisherman consists of a pike rod, a bottom rod, landing net, reels, two lines, one stout and one finer, hooks of various sizes, gut casts, and two or three floats.

SALMON FISHING. The acme of salmon angling is with the artificial fly. In some rivers, and at different seasons, spinning is more profitable, and in certain conditions bait-fishing may be permissible. As most sportsmen prefer to catch salmon with the fly, every beginner should master the art of casting. The rod is grasped with the left hand below the reel and the right hand above it. The angler should face slightly downstream, and advance the right foot. In casting, the fly should be thrown backwards and overhead, but not high in the air, and when the line is well extended, a swing forward must be given to the rod and the fly directed as towards an imaginary object on the water. The cast must be made cleanly and without lashing the water violently with the line. When the cast is made the fly will sink, and it must be allowed to float down the stream under water. During its course some slight jerks must be given to the rod to keep the fly "lively," and the line should be kept as straight as

possible from the point of the rod. Only practice will enable the novice to avoid a bagging line. In quiet pools and in lochs, a sharper motion of the fly in the water is necessary. The Spey cast, practised in strongly flowing rivers, is performed by bringing back the rod in a vertical position and inclining it slightly to the right or left before casting. In this cast the line must not be extended behind the fisherman, but should be allowed to form a loop, which strikes the water before the fly.

Points in Salmon Fishing

The chief points are accuracy in placing the fly wherever a salmon is likely to be lying, and careful working of the fly with a straight line whenever possible. As a rule salmon hook themselves, but it is always advisable to put an immediate strain on the fish when it has taken the fly. Playing a lively salmon is often active exercise, especially in swift and rocky rivers. The fisherman should endeavour to turn the salmon's head downstream or across the stream, and not allow the fish to fight up water. The angler must on no account give any slack line to his fish, but he must avoid a too severe strain until the salmon is wearied. When the fish is beaten it should be drawn to the bank and secured with a quick, accurate stroke of the gaff, the rod being changed to the left hand. Spinning for salmon requires skill in casting and working the bait: trolling from a moving boat, with sixty yards of line extended, is a much simpler, though less sportsmanlike, method. The spinning bait must not be pulled too swiftly through the water. It should be drawn in slow jerks, and the rod may be inclined first to the right and then to the left in bringing back the bait. In streams the bait is cast down or across stream, and drawn against the current. Natural as well as artificial baits may be used. Other baits are the prawn, upon tackle made for the purpose, and the lobworm, which is usually kept slightly moving in the water. In many preserved waters fly-fishing only is permitted.

Salmon frequent the deeper pools of rivers, and the deeper currents, though they are sometimes caught in the shallows during a flood. The habits of the salmon vary in different waters, and in some rivers the fly is not always a sure lure, though the fish may be abundant. When the rivers are low the salmon remain in hiding during the daylight, only venturing out after sunset. After a flood in the river salmon may be expected in due season

(which varies) to ascend the rivers from the sea. The best sport is usually experienced when the river is clearing after a flood.

The rod is an important weapon in salmon fishing. Rods vary in length from 12 ft. to 18 ft., and are made of split cane throughout, or greenheart, and in some cases hickory and greenheart. A built cane salmon rod of good workmanship will last for years with care. The rod should be adapted to the strength of the fisherman. A long cast may be made with a 12-ft. rod, but some anglers prefer a rod of 16 ft. for big rivers. The greenheart rods are considerably heavier than those made of split cane. Reels that will serve for either fly-fishing or spinning have greatly improved in the last fifty years. They are made of aluminium, instead of the heavier brass or gun-metal, and their action is more perfect. The reel should hold at least 100 yds. of good dressed line, which may be tapered for fly-fishing. With a heavy rod a heavy line is necessary, but some split cane rods will throw a light line. For spinning, undressed flax or silk lines are preferred by many anglers. Lines for fly-fishing are of silk, dressed with a preparation to resist water. Some of these lines

soleskun phantom, or a "clipper," and a spoon-bait is often effective in lochs and discoloured rivers.

In some rivers the salmon fisherman will enjoy the best sport by wading to the lurking places of the fish. The wading outfit consists of rubber trousers, with thick socks over the feet, a pair of canvas or leather brogues studded with nails, and a short mackintosh. A steel gaff in a short handle is required for landing.

The best salmon rivers of the British Isles are in Scotland and Ireland. The Tweed, Annan, Deveron, Findhorn, Tay, Dee, Naver, and Inver are among the famous Scottish waters; in Ireland the Shannon, Erne, Bann, and Mourne. Well-known Welsh rivers are the Dee, Usk, Conway, Severn,

streams of the West and North of Ireland. Sea trout have been taken about 3 ft. in length. Fish of from 3 lb. to 5 lb. are very lusty and strong, and a sea trout of less weight is a great fighter when hooked on ordinary trout tackle. A single-handed fly-rod may be employed for sea trout. If they average a pound, fine casts are strong enough. Bright flies are in favour among sea trout anglers, and small salmon or loch flies are sometimes attached to the cast. In fine water, in summer time, small flies are best. Sea trout are variable in their feeding habits. Generally speaking, the best fishing is after a spate in the river, when the fish are fresh from the sea or estuary. The fly is worked in fishing for sea trout. Spinning often accounts for heavy baskets; large catches are made in many rivers by worm-fishing, or fly-fishing at night.

Trout fishing with the artificial fly is an art that excels all others in the sport of angling. Fly-fishing is now very popular, and its practitioners are constantly developing its tactics in order to cope with the "educated" trout of clear streams. The easiest form of fly-fishing is with a wet or sunk fly in a rough mountain brook, well stocked with free-rising fish.



Angling. Successive positions of the rod in casting for trout with a fly. Top: The beginning of the cast. Left: The fly nearing the water. Right: The end of the cast

have a breaking strain of 42 lb. dead weight, and are used for big salmon in powerful rivers.

The list of salmon flies is very large. General favourites are the Durham Ranger, Jock Scott, Wilkinson, Dusty Miller, Butcher, Silver Grey, Popham, and the Doctor. There are also special patterns tied for certain rivers. The cast for salmon fishing is made of the finest quality gut. For heavy salmon twisted gut is sometimes essential. Casts and traces for spinning should be of the finest quality. The Hercules casts can be recommended. Artificial spinning baits may be the same as those used in pike fishing. Usually salmon will take a large silver or gilt Devon minnow, a

Glaslyn, Teifi, and Towy. Favourite English rivers are the Wye, Avon (Hampshire), Eden, Dart, and Tavy. Most of the salmon fishing in the British Islands is privately owned, but lengths can be rented, and there are hotel waters on some good rivers.

SEA TROUT FISHING. The sea trout is of the salmon family, and is a migratory fish that comes into fresh water to spawn. In Ireland these fish are called white trout, in Devonshire peel, in Wales sewin, and in Scotland sea trout and herling. They afford capital sport in several rivers, notably the Devon and Cornwall streams, the Dovey and Conway in Wales, the Deveron, Findhorn, and several lochs in Scotland, and many

In the first stage the beginner should cast a short line, not longer than twice the length of the rod. The rod is grasped above the reel, and the thumb should extend along the butt. Too much wrist action must be avoided, and the cast should be made with the whole of the forearm. The line must fall lightly on the water, upstream if practicable, and the rod must be raised vertically, as the fly floats down towards the angler. The chief haunts of trout are near the ends of pools, where the current is succeeded by a broken stream or "run," in the swift shallows, and off the edge of the tumbling water. When a breeze is blowing, the pools may be fished with advantage. In the

height of summer trout lie in the quickly flowing water, and in a long drought they resort to the deeper pools.

Two or three flies may be used in wet-fly fishing. These are attached to a fine gut cast about 3 yds. long. They should be about 18 ins. apart. The fly on the point is usually called the "tail-fly," those above are the "droppers." The upper dropper should just skim the surface of the water. When a swirl or rings are seen in the immediate vicinity of the flies, it is an indication of a "rise," and the fisherman should promptly twitch the rod upwards, i.e. "strike," to drive in the hook.

Lake fishing is practised from a boat or from the shores. In boat fishing it is usual to drift with the wind, and make shortish casts with the breeze, or lateral casts from the bows or stern. Lake trout chiefly frequent the shallow water, the bays, the outlets of streams, and weedy corners. A slow, jerking motion should be given to the fly in loch fishing. Unless the water is ruffled by a breeze, fly-fishing in still water is rarely successful. Windy days, with subdued sunlight, are often propitious.

Methods of Dry-Fly Fishing

Having practised the wet-fly method for a few weeks, the novice may essay the more complicated science of the dry fly. Only one floating fly is attached to the cast, which should be delicately tapered. The fly is touched with paraffin to cause it to float. There are two ways of dry-fly fishing—watching the rise, and casting into all likely places. On Southern rivers, experts usually "fish the rise." The angler closely scans 50 yds. or so of the stream, until he sees a trout take a natural fly. He then stalks within casting distance, sometimes crawling and kneeling, and presents the fly deftly just above the rising fish. On no account must the shadow of the fisherman fall upon the spot where the trout are rising. Success depends greatly upon careful stalking, especially in clear waters with a moderate flow. When the floating fly falls lightly on the stream, no movement must be imparted to it, but it should sail down with the current, without the slightest "drag" of the cast. Avoidance of drag can be learnt only by practice. The fly must be tied with erect wings, resembling the natural insect.

Among artificial flies, the following are useful for wet-fly fishing: March Brown, Blue Dun, Wick-

ham's Fancy, Alder, Mayfly, and Iron Blue. Some may be "hackled," i.e. wingless and "buzzy," and others winged. Any of them will take trout by the wet-fly or dry-fly method if used at the proper season. The Alder kills in summer, and the Iron Blue on dull, windy days. Standard lake flies are: Teal and Black, Teal and Orange, Grouse and Claret, Mallard and Yellow, Heckam Peckham, and Woodcock and Red.

Trout can be taken with minnow on a suitable trace, artificial spinning baits, and small quill minnow. The natural minnow is used chiefly in summer and autumn. Fishing with a worm upstream, in low, bright water, may avail in summer when the fly is refused. The bait must be dropped into all likely places near rocks and under banks.

ANGLING IN SALT WATER. The newer methods are with rod, reel, and line, and finer casts than formerly. Sea rods are from 6½ ft. to 10 ft. long, fitted with line pulleys and large rings. The equipment includes reels holding 100 yds. of line, leads for sinking bait, hooks, gut casts, fine wire traces, artificial baits, and a gaff.

Rocky shores afford the best rod-fishing, but the feeding grounds of fish may be over a mile from the coast. Bass, pollack, and congers frequent rocks; flat fish are found in sandy bays. Fly-fishing for bass may be enjoyed in British estuaries and bays during summer. A salmon rod and flies may be used for bass and pollack. The principal sea-baits are lugworms, shrimps, mussels, crabs, fish offal, and various shell-fish. Sand eels are good bait for bass. Cod may be taken close to the shore with lugworm or crab bait.

Bibliography. *The Secrets of Angling*, John Denny, 1613, repr. T. Westwood, 1885; *The Compleat Angler*, Izaak Walton, 1653, and over 100 editions; *Flyfishing*, Lord Grey, 1899; *Fishing* (Badminton Library), H. Cholmondeley Pennell, 1903-6; *The Complete Fisherman*, W. M. Gallichan, 1907; *Book on Angling*, F. Francis, repr. 1920; *Angling Theories and Methods*, R. A. Chrystal, 1932; *Angler's Creel*, A. Wanless, 1944; *The Complete Fly Fisherman*, T. Gordon, 1949.

Anglo-Egyptian Sudan. Territory in N.E. Africa. It is a condominium administered by a governor-general appointed by Egypt upon British recommendation. Bounded N. by the 22nd parallel of N. lat. beyond which lies Egypt; W. by French Equatorial Africa; S. by Belgian Congo and Uganda; E. by Abyssinia and the Red Sea; the territory covers 967,500 sq. m., including most of the Nile valley. About 1,650 m. from N. to S., it is up to 1,000 m. from E. to W. Divided into nine provs.—Bahrel-Ghazal, Equatoria, Upper Nile (the S. provs.); Blue Nile, Darfur, Kassala, Khartum, Kordofan, Northern (the N. provs.)—each under a governor, it has an est. pop. of 7,547,500, all black except 41,720. Omdurman, old dervish capital, has 117,650 inhabitants; Khartum, the present capital, 61,800; Port Sudan, 47,000. In the N. dwell Arabised Muslims; elsewhere Nilotic and negro tribes.

Forests near the Blue Nile yield fibres and tanning material; mahogany and acacia grow in the S. This country is the main source of gum arabic. Egyptian cotton thrives, also the long-staple American type. Dates, nuts, millet, beans, senna leaves, are the chief edible products; salt pans supply the whole country; gold is mined at Gabait.

Joint administration began in 1899. In 1948 a legislative assembly and executive council were inaugurated, first elections favouring the Independence party. Discussions from 1946 revealed that while many Egyptians wanted permanent union with the Sudan, the British supported Sudanese self-determination. Egypt put the question before the U.N., which recommended no action, 1947.

Anglo-French Union Proposal. Offer made by British government on the eve of France's capitulation to Germany in 1940. On June 17 it was announced in London that the government had offered to conclude an Act of Union between the two countries. The draft declaration had been communicated to the French government on June 16. Britain and France were no longer to be two nations but one Franco-British Union, with joint organizations for defence, foreign, financial, and economic policies. Every French citizen was to enjoy British citizenship, and vice-versa.

During the war there would be a single war cabinet and the two parliaments were to be formally associated. Churchill, the British prime minister, was on the point of leaving for France to discuss this declaration with Reynaud, the French premier, when it became known that Reynaud had been replaced by Pétain.

On April 25, 1945, Mr. Churchill stated that the offer to France would not be renewed.

Anglo-Iranian Oil Company.

Large British industrial undertaking, whose major interests lie in Iran (Persia). In 1901 the Persian government granted to W. K. D'Arcy, a British subject, a concession for the exploration and exploitation of petroleum. The concession was for a period of 60 years and, amongst other things, conferred upon the holder the exclusive right to work all deposits of petroleum throughout Iran, except in the five northern provinces of Azerbaijan, Gilan, Mazandaran, Astrabad, and Khorassan. Prospecting first began at a point near Qasr-i-Shirin in the N.W. part of the country, but was later transferred to the Bakhtiari foothills, some 70 m. N.E. of Ahwaz. Here, at Masjid-i-Sulaiman petroleum wells were drilled which yielded oil of a quality and quantity that led to the formation of this company in 1909, for the purpose of acquiring and developing the D'Arcy concession. In 1914 the British government was empowered by parliament to take ordinary shares in the company to the extent of £2,000,000 (2,000,000 £1 shares at par), and this holding has since been increased until in 1945 it amounted to a total of £11,250,000 of the ordinary stock of the company; the British government also held £1,000 8 per cent preference stock. On April 29, 1933, the D'Arcy concession was replaced by a new concession, which came into force a month

later. The new concession covered an area of 100,000 square miles and was for a period of 60 years, ending Dec. 31, 1993.

In addition to the original oilfield at Masjid-i-Sulaiman further oilfields have been discovered to the S.E. of the first field. All these areas are connected by pipelines to the refinery at Abadan, which is also the headquarters in Iran of the company. The distance by pipeline from Masjid-i-Sulaiman to Abadan is 142 miles, and from Gach Saran 167 miles. The refinery at Abadan is the largest in the world under a single control, with a max. capacity for processing approx. 17 million tons of crude oil per year.

In June, 1934, the Anglo-Iranian Oil Co. formed a small subsidiary company named the Kermanshah Petroleum Co., Ltd., to operate in the province of Kermanshah. The oilfield in this area is adjacent to the Iran-Iraq frontier in the vicinity of Qasr-i-Shirin, and is connected to a small refinery near the town of Kermanshah, some 81 miles E. of the frontier on the road to Tehran. Products from this refinery are utilised solely to meet local demands in N.W. Iran.

In 1935 the original name, Anglo-Persian Oil Co., Ltd., was formally changed to Anglo-Iranian Oil Co., Ltd., in deference to the wishes of the Iranian government, whose desire it was that the word Iran should be universally introduced in place of the more familiar word Persia.

Anglo-Saxon.

Language of a N. part of Germany, brought into England by Angles, Saxons, and Jutes and there modified; also name applied to those peoples between the times, roughly, of Alfred and the Norman Conquest. While applied to the English race, wherever found, to denote their descent from the Angles and Saxons, the modern tendency is to substitute the word British so as to include Celtic elements

Anglo-Saxon Antiquities. The material remains of early England. The more pretentious dwellings and some churches, e.g. Greenstead, Essex, were of sawn timber, while the peasantry continued to use wattle- and -daub. Dressed masonry was introduced in the 7th century by Gaulish craftsmen. The industrial arts are illustrated mainly from pagan grave-mounds, wherein the fully dressed bodies were interred with their grave-goods, sometimes with traces of the animal sacrifices of primitive Teutondom. Out of 323 Anglo-Saxon cemeteries enumerated by G. Baldwin Brown, 65 bear evidences of cremation.

The national weapon was the leaf-shaped spear, fitted by a split socket—the Danish being unsplit—to an ironshod shaft 6 ft. long. Barbed javelins (*angon*) were commoner in Kent. The Frankish sword-knife (*scramasax*) was sometimes damascened with runes; the battle-axe was rare. The two-edged sword was borne by nobles and thanes, the hilt being often patterned with interlacings, gems, and silver. The wood or wicker shield was round or ovoid, with an iron boss (*umbo*), sometimes gilded.

The most characteristic ornament was the brooch, of which eight types are distinguished. Other articles of dress and the toilet are girdle-hangers, combs, buckles, bronze tweezers, and—more rarely—hairpins and earrings. Metal-bound wood buckets (*situla*) apparently held grave-food; primitive magic survived in crystal balls and amulets. Native pottery was well developed; round-based glass vases, with spiral threads, were, like the amber and glass beads, mostly importations. Silverwork is represented by the Trewiddle chalice and the S. Cuthbert Altar, Durham. Goldsmiths' inlay work, under ultimate Scythian influence, won European fame. Besides the Alfred Jewel (*q.v.*) outstanding examples are the 7th century Wilton pendant and the Ethelwulf ring. Consult Anglo-Saxon Art to A.D. 900, T. D. Kendrick, 1938; Anglo-Saxon England, F. M. Stenton, 1943.

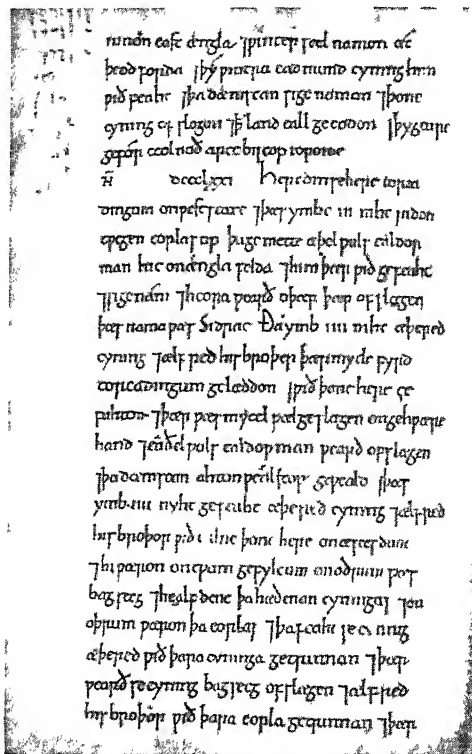
E. G. Harmer

Anglo-Saxon Chronicle, THE.

Name given to a narrative which relates the history of England from the birth of Christ to 1154. It is written in Anglo-Saxon prose, the information being arranged chronologically and without any embellishments or graces of style.



Anglo-Egyptian Sudan. See text in page 448



Anglo-Saxon Chronicle Reduced facsimile of a page of this early history of England from an 11th century MS
Cottonian MSS British Museum

The following is typical of the shorter entries, "821. Herein was Ceolwulf deprived of his kingdom." The dates are not always accurate, and some of the matter is obviously legendary, but there is no reason to doubt the genuine character of the bulk of the contents.

The compilation of the Chronicle was probably begun in the time of Alfred the Great just before 900, and possibly at his instigation. Its early part was taken from Bede's History, from oral traditions, and from other sources and is of little value. Scanty at first, it is much fuller for the 7th and succeeding centuries, and for the 8th and 9th especially is a valuable source of knowledge.

In reality there are several chronicles, and in the seven existing MSS four distinct narratives have been distinguished. The theory is that Alfred had a chronicle compiled at Winchester. Several copies of this were made, and these were sent to various monasteries, where the monks continued the story. This accounts for the differences, additions being made from local knowledge. For instance, one chronicle probably compiled at Ripon, contains some extra information about

Northumbrian, and others about Mercian, affairs. Three of the chronicles end about the time of the Norman Conquest, the fourth the Peterborough, takes the story down to 1154. There are several good translations, including one by J. Ingram (Everyman Library). See Anglo-Saxon Literature.

Two distinct churches were thus in process of organization, and to unite them the synod of Whitby was held in 664. The decision taken here, after a heated debate, was that Roman practices should be adopted and this brought the church in England into close relation with Rome. Theodore, who became archbishop of Canterbury in 668, built on this foundation. He reorganized the church, held a synod of the whole, and drew up rules for its government. Henceforward there was only development. The early dioceses were usually continuous with the little Anglo-Saxon kingdoms, and the bishops among the chief counsellors of the kings. There was an archbishop at York, and for a time one at Lichfield, but it was not until long after 1066 that Canter-

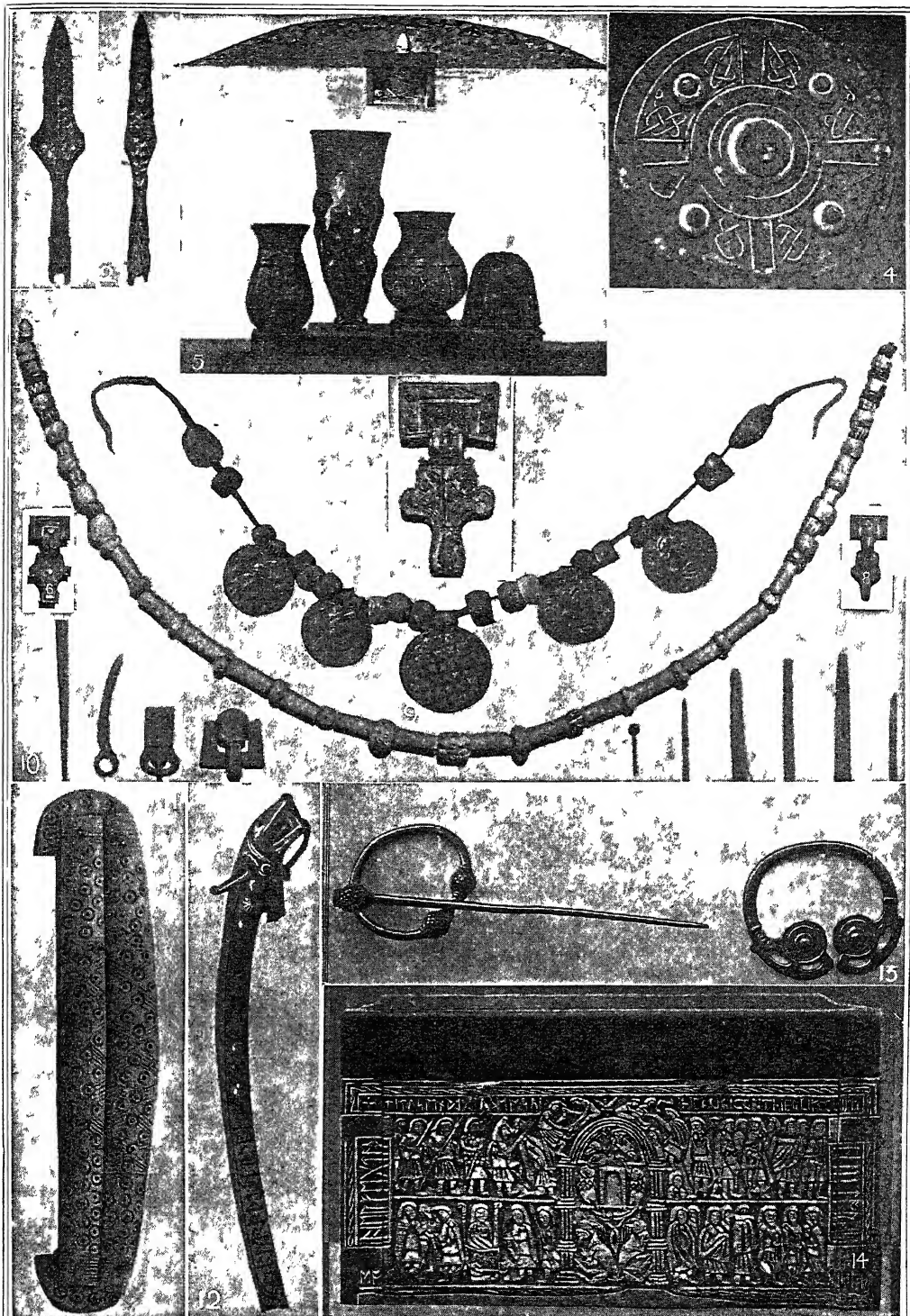
bury was definitely recognized as having precedence over York. See Church of England.

Anglo-Saxon Law. Very little is known of Anglo-Saxon law probably for the reason that in Anglo-Saxon times there was no centralized administration of justice. The law was not, as it became after the Norman Conquest, administered mainly by the king's judges, but by local courts or moots, the principal of which was the shire moot, afterwards called the county court. There were also the hundred moot, for the hundred, the burgh moot, for the burgh, the tithing moot, for the tithing, and from these something like an appeal lay to the shire moot, which consisted of the freemen of the county. The shire moot was a lay body, presided over by the earl, the bishop, and the alderman, of whom none was a lawyer, it was, in fact, more like a parliament than a law court as now understood. There seems to have been a right of appeal in case of injustice to the king and the witenagemot, or national council.

For the most part, in ordinary affairs, Anglo-Saxon law was local and customary, not national and rigid. A few facts are known. The land tenure of Anglo-Saxon England was allodial, not feudal; that is to say, the land was owned by its possessor, not held of a lord and finally of the king, as it is even now in theory. The landowner was under the *trinoda necessitas* or threefold obligation of maintaining roads, repairing bridges and defending the country.

Criminal law and practice were primitive. For certain crimes of personal violence there was a tariff. If the assaulting party destroyed a man's eye he must pay so much, for a hand so much—more for the right hand than for the left. In the case of theft, if the thief could not be found, the whole hundred where the larceny was committed must make good the value of the stolen property. When a person accused denied his guilt, he might clear himself either by the ordeal or by the oath of "lawful men," 12 men who were neither serfs nor outlaws.

There was a curious kind of cross-swearing. The accuser brought up as many people as he could muster, who swore that they believed the accused to be guilty. The accused then produced, if he could, an equal number who swore that they believed him innocent. If he could not, he seems to have been adjudged guilty. But it was not a mere trial of numerical strength, for the oath of an earl, for



1 and 2 Spear heads found near Salisbury 3 Section of barrow at Bamborough Northumberland 4 Brooch found near Abingdon Berks 5 Vessels unearthed in Kent and Suffolk 6 7 and 8 Ornaments found in the Isle of Wight 9 Bead necklace Isle of Wight and

above it necklace of glass beads with enamel pendant and four gold coins 10 Buckles pins etc Isle of Wight 11 Bone comb Lincoln 12 Sword knife with inscribed blade from the Thames 13 Two silver brooches 14 Back of whalebone casket inscribed with runes

ANGLO-SAXON ANTIQUITIES FROM GRAVE MOUNDS AND RIVER BEDS (See page 449)

example, was equal to that of a number of corals. No evidence seems to have been given.

Trial by ordeal, abolished by a decree of the Lateran Council in 1215, was even more curious. The accused could demand the ordeal, which had many forms, including the hot iron. A variation of this was to walk with bare feet over red-hot ploughshares. Another was to plunge the arm into a cauldron of boiling water and bring out a stone from the bottom. Women were excused the hot iron and hot water, but were generally tied up and thrown into a pond. A woman who sank was innocent.

Outlawry was a favourite Saxon punishment. It was inflicted either as a sentence after an offence proven, or on a person who refused to stand his trial. An interval was allowed the man to escape beyond the jurisdiction, after which he might lawfully be killed by anyone who found him.

Bibliography. English Law, vol. i, Pollock and Maitland; Anglo-Saxon Wills, D. Whitelock, 1930; Anglo-Saxon Charters, ed. A. G. Robertson, 1939.

Anglo-Saxon Literature. Term used to denote the literature of the English people which was produced from about the 7th to the 11th century. Though the tendency among scholars is to deal with Anglo-Saxon literature under the somewhat indefinite name of Early English, the older title is the more convenient, as being better indicative of a special historical period.

The earliest, or that which is generally accepted as the earliest, work in this literature is the epic Beowulf. This poem is so closely connected with the Teutonic invaders that it is only the circumstance of its having been, as it is believed, written in Northumbria that makes it English. Students of this poem are in disagreement as to whether it is a story of some legendary hero of the Continent, or whether it can be claimed to be an English story with an English setting. It is certainly akin in character to the old German Lay of Hildebrand, of which only a fragment has come down. Yet the Anglo-Saxon literary period has characteristics which mark it off very definitely from that out of which it grew, and also from another form which was developing among the Norse peoples. The large part of Beowulf which has been preserved, along with fragments of other poems—Waldherc, Fight at Finnesburh, Battle of Maldon, etc.

—show a command of vigorous narrative and free use of rhetoric that places them in a far higher literary category than any other comparable primitive literature.

Following on the heroic narrative poetry referred to there is also a remarkable body of religious poetry, much of which is associated more especially with the names of Caedmon and Cynewulf, including renderings, some of them peculiarly fine, of Bible stories, e.g. Genesis, Exodus, Andreas, Judith, etc. Then, too, there are interesting examples of shorter poems, e.g. Widsith, The Seafarer, and a goodly if on the whole less remarkable body of prose, including The Anglo-Saxon Chronicle and the series of translations made by King Alfred. De Quincey has declared that the writers of the Chronicle had at command a vocabulary of only 600 to 800 words. See Anglo-Saxon Chronicle; Andreas; Beowulf; Caedmon, Cynewulf; English Literature; Exeter Book; Vercelli Book, etc.

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Angmering-on-Sea. Modern coastal resort of Sussex, England, 5 m. W. of Worthing. The parent village of the same name lies in

land; here the remains of a Roman villa were discovered.

Angola (Bantu, *Ngola*), or PORTUGUESE WEST AFRICA. Largest colony of Portugal. It is bounded N.E. by the Belgian Congo, S.E. by Rhodesia, S. by the territory of South-West Africa, W. by the Atlantic Ocean. A small detached enclave, Cabinda, lies to the N. between the Congo and French Equatorial Africa. Situated wholly in the tropics, and, save for Cabinda, south of the Congo river, Angola has over 1,000 miles of coast, and is otherwise mainly a plateau, rising by terraced hills to about 2,000 ft. in the N., over 6,000 ft. in the S., and reaching 7,349 ft. in Loviti, towards the centre. This plateau forms the watershed between the Congo and Zambezi systems. It gives rise to the Kwango, flowing N. to the Congo; the Kwanza and Kunene, issuing into the Atlantic; and the Kubango, flowing E. The climate has well-defined seasons, drought from June to Oct. (winter), rains from Nov. to April.

Cultivation of sugar, cotton, rice, maize, palm oil, rubber, coffee, sisal, tobacco, and tropical fruits is undertaken by native labour. The grass uplands, almost free of tsetse fly, are suitable for stock raising, and a liberal land policy has encouraged holdings of all sizes. Wax and a few equatorial woods like ebony and mahogany are produced. Diamonds and salt are mined, and iron is worked by native blacksmiths; coal, copper, gold, silver, and sulphur await exploitation. Exports to Europe include coffee, maize, diamonds, sugar, wax, and coconuts.

Angola was discovered and explored between 1482-5 by Diogo Camo, and was soon developed under treaty rights with native kings. It has been held continually by the Portuguese except for an occupation by Dutch artisans, 1641-48. Loanda, or São Paulo de Loanda, the capital, was founded in 1575. Huambo, 266 m. from the coast, was in 1927 designated the future capital, to



Angola. Map of the Portuguese colony also called Portuguese West Africa founded in 1575

be known as Nova Lisboa. Lobitos is perhaps the finest harbour in Africa. Other ports are Ambriz and Mossamedes. Lubango and Malange are growing railroad towns. The country is ruled by a governor-general and organized into 14 administrative districts among five provinces. The area is 481,351 sq. m. and the pop. in 1940 was 3,738,010, of whom 44,083 were Europeans and a large majority of the rest Bantu Negroes.

Primary education is available in 73 schools, secondary in two. Ecclesiastically Angola is a diocese of the Roman Catholic church in the province of Lisbon. Missionaries attend to much of the native instruction. There are 1,442 miles of rly., including a line from Benguela E. across the whole country to the Belgian Congo, and routes from Loanda to Malange and Mossamedes to Lubango. Good motor roads total 23,350 miles.

Bibliography. Through Angola, J. C. B. Statham, 1922; Angolan Sketches, T. A. Barns, 1928; Angola, the Land of the Blacksmith Prince, J. T. Tucker, 1933.

Angoniland. A plateau of E. central Africa. It lies to the S.W. of Lake Nyasa, has a mean elevation of 4,000 ft., and is inhabited by the Angoni, who were formerly members of the Zulu confederation. Central Angoniland forms a district in the Nyasaland Protectorate. Area 5,884 sq. m.

Angora. Former name of the present capital of Turkey, as well as of the vilayet of which it is the chief town, and the river on which it stands, each of which is now called Ankara (*q.v.*).

Angora Goat (*Capra angorensis*). Long-haired breed of Asiatic goat, named after Angora in Asia Minor. Angora wool is produced from the goats. This is used for making light, warm shawls, chiefly at Grenoble, France. See Mohair.

Angora Rabbit. The only long-tailed variety of rabbit. Believed to have originated in Asia Minor and Persia, it was brought to Great Britain as an exhibition pet about 1850. White is the most popular colour. A fine specimen should weigh about 6 lb., and have a fleecy coat over the whole body, short and erect ears with hanging tufts at their tips, deep bright pink eyes, straight and heavily woolly legs and tail. The commercial side of the keeping of Angoras was much developed between the two Great Wars. An average rabbit may yield $\frac{1}{2}$ lb. of wool a year, and first quality

British wool has been priced at 30s. a lb.

Angostura Bark. The bark of small trees (*Galipea officinalis* and *Cusparia febrifuga*), natives of tropical America, and included in the order Rutaceae. It yields a stimulant tonic, which has been used in place of cinchona in treating fever. The tonic known as Angostura Bitters is an essence containing angostura bark together with various aromatics.

Angoulême. City of France. The capital of the department of Charente, it stands on a hill between the Charente and its tributary, the Anguienne, is 83 m. N. by E. of Bordeaux on the rly. to Poitiers, and is at the head of the navigation of the river. It is the seat of a bishop and has an important wine trade, and paper and other manufactures. The cathedral of S. Pierre, erected in the 11th and 12th centuries, has been altered considerably. Surrounded by boulevards, which occupy the site of the old fortifications, the hôtel de ville, now a museum, is an imposing building. Angoulême is an old city and its counts were persons of importance in French history at a very early date. Later their lands passed to the crown; members of the royal family long bore the title of duke of Angoulême (*see below*). Pop. 36,699.

Angoulême, LOUIS ANTOINE, DUKE OF (1775-1844). French prince and soldier. The eldest son of Charles Philippe, count of Artois, later Charles X of France, he was born at Versailles, Aug. 6, 1775. He left France at the outbreak of the Revolution and after some military service lived in exile. In 1799 he married his cousin Maria Theresa, daughter of Louis XVI. During the Hundred Days he unsuccessfully opposed Napoleon, and in 1823 was in command of the French expedition in Spain. He joined his father in exile, signing an abdication of the throne in 1830, and died at Görz, June 3, 1844.

Angoxa or **ANGOSTA.** A coast district and small town on the Angoxa river, Portuguese E. Africa. Known also as Angoche and by the Portuguese as Antonio Ennes, the seaport, 60 m. S. of Mozambique, is accessible by small steamers and has a trade in copra and ground-nuts. Part of the district, the coast line of which is 90 m. long, was leased to a British company as a rubber plantation. Its products include coir, cocoa, sesame oil, and ivory.

Angra do Heroísmo. Fortified seaport and the chief town of

the Azores. It stands on the S. coast of Terceira Island, and exports wine, cereals, and fruit. The name is Portuguese for Bay of Heroism. Pop. 11,000.

Angra Pequena. Harbour in South-West Africa, now known as Lüderitz Bay (*q.v.*).

Angriff, DER (German, The Attack). Daily Berlin evening newspaper of the National Socialist Party. Created by Josef Goebbels (*q.v.*), 1928, originally appearing twice weekly, it soon became the first Nazi daily of the German capital, with a circulation of over 100,000. It established Goebbels as a propagandist, though he ceased to edit the paper officially when the Nazis came to power in 1933. But he remained its undisputed master and used it to serve his own political ends until Feb., 1945, when the end of its publication was announced.

Ångström, ANDERS JONAS (1814-74). Swedish physicist. Born Aug. 13, 1814, he was educated at Upsala university and in due course became keeper of the observatory and professor of physics. His life was devoted to the study of heat, magnetism, and spectroscopy, and in all three he made large additions to scientific knowledge. The unit used to measure the wavelength of light was named Ångström in his honour. He died at Uppsala, June 21, 1874.

His son, Knut Johann Ångström (1857-1910), also became famous as a physicist and as the inventor of many scientific instruments.

Ångström Unit. Unit of measurement of wavelengths of electromagnetic radiations, including light and radio-active waves. Abbreviated Å.u., 1 unit equals 10^{-8} cm., or one-hundred-millionth part of a centimetre. The spectrum of light from the infra-red to the ultra-violet ranges from about 8,000 Å.u. to 1,000 Å.u. The frequency of vibration of each of the colour rays on this scale is directly related to its measurement in Ångström units and is therefore directly comparable. Red light, for instance, has a wavelength of 6,500 Å.u. with a corresponding frequency of 464 billion vibrations per second. The gamma rays of radium are $\cdot 015$ to $\cdot 15$ Å.u., and, at the other end of the radiation spectrum, wireless waves range from 3 mm. or 30 million Å.u. upwards. There is also an international Ångström unit. See Light; Spectrum.

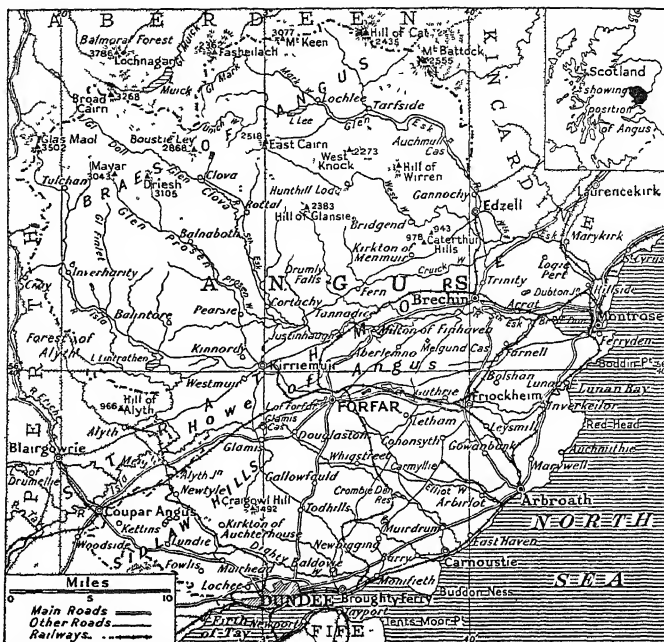
Anguilla. One of the Leeward Islands, British West Indies. Among the northernmost of the Lesser Antilles, it has an area of 34 sq. m. and produces cotton, horses, cattle, sheep, goats, salt, and phosphates. Pop. 5,175, chiefly negroes.

Angul. District of Orissa, India. With the exception of the hilly S. part, the district is flat, and has an area of 1,681 sq. m. Coal and iron are mined. Once a tributary state of Orissa, it was confiscated in 1847. Pop. 199,000.

Angular Motion. Term used in dynamics. Any displacement of a body may be produced by moving the body forward or by rotating it about a certain axis through the centre of figure of the body, or by a combination of these two motions. Thus a fly-wheel moves about its hub, but it is clear that the movement of a particle at the end of one of the spokes is not at the same rate as that of a particle near the hub. The movement or velocity of rotation of the fly-wheel as a whole is therefore measured, either by the number of turns made in a given time, or by the speed of a particle at a unit distance from the hub. This speed is called the angular velocity; the term angular motion is derived from it.

Angus. Eastern maritime county of Scotland, bounded N. by Aberdeenshire and Kincardineshire, W. by Perthshire, S. by the Firth of Tay. It was known as Forfarshire from the 16th century until 1928, when the old name, derived perhaps from a legendary chief or from a hill near Aberlemno, was revived. Of the 873 sq. m. of Angus, about one third is highland country, Glas Maol in the Grampians reaching 3,502 ft. The varied surface of the co. falls into four main divisions: the Braes in the N.W., scored by the famous glens Esk, Prosen, Clova, and Isla; the Howe, or Strathmore, in the centre, one of the most fertile plains in Scotland; the Sidlaw Hills which continue into Perthshire in the S.W.; and the coastal strip on which stand the ports of Dundee, Arbroath, and Montrose. The longest rivers are the North and South Esk and the Isla; there are a few inconsiderable lochs. Incheape Rock (*q.v.*) belongs to the county.

Agriculture is the chief industry, with oats the main crop; wheat is grown in Strathmore. Sheep and cattle, pigs, and Clydesdale horses are raised. Jute and flax manufacture, bleaching, confec-



Angus. Map of the east coast county of Scotland formerly known as Forfarshire. The Braes of Angus form part of the great range of the Grampians

tionery, distilling, and shipbuilding are the activities of Dundee. Sea fishing thrives along the entire coast. Angus joins with Kincardineshire to elect two M.P.s, while Dundee has its own two. The est. pop. is 279,500. Forfar (11,062) is the county town, but Dundee (181,800) is much the biggest. Inland places include Brechin, Kirriemuir, Frickheim, and Newtyle. Carnoustie is noted for golf. Antiquities include castle ruins at Edzell and Melgund, towers at Affleck and Brechin, and the fort of Inverquhar. Glamis castle is the home of the Strathmore family, from which came Queen Elizabeth, consort of George VI. Kirriemuir was the birthplace of Sir James Barrie (*q.v.*), who made it famous in literature under the name of Thrums. Evidence abounds of Pictish and Roman occupation.

At Dundee was born in 1465 Hector Boece (*q.v.*), and 80 years later, at Baldovie, the educational reformer, Andrew Melville. Angus poets include James Tytler, of Brechin, who edited the second and third editions of the *Encyclopaedia Britannica*.

Angus is the title of an earldom now held by the dukes of Hamilton; also a common Christian name in Scotland.

Anhalt. Former state of central Germany. A principality from

the 13th century, it joined the German empire as a duchy in 1871, renounced allegiance after the First Great War, and became a state of the German republic, July 18, 1919. On both sides of the Elbe, it was surrounded by provinces of Prussia. Dessau was the capital and largest town. The area was 888 sq. m.; pop. 436,000.

Anhalt ceased to be a state and was incorporated in the Reich, 1934. The area is agricultural and yields wheat, vegetables, hops, and tobacco. It has extensive forests in which deer are found, and fish are plentiful in the rivers. Lignite, salt, potash, and silver occur. After the Second Great War, the area was allotted as part of the Russian zone of occupation in Germany.

Anhui or **Nganwhi.** Province of China. It lies to the W. of the coast prov. of Kiangsu, of which it was formerly a part, and is traversed by the Yang-tse-kiang. Area, 87,929 sq. m.; pop. 22,705,000. The part of Anhui lying N. of the Yang-tse-kiang is watered by the Hwaiko and its tributaries, and is a fertile plain, constituting the principal rice-producing area of China, with Wuhu as one of the four most important rice-marketing centres in the country. Other products include tea, paper, and timber. Hwaining, formerly Anking, is the capital.

Anhydrides (Greek *an-*, not; *hydōr*, water). Oxides which react with water to form acids, or are obtained from acids by withdrawing water. Acid anhydrides are the acid radicals remaining after abstracting water from the acid. Sulphuric acid (H_2SO_4), with water (H_2O) abstracted, leaves sulphuric anhydride (SO_3). Similarly, the anhydride of an organic body is the substance obtained from it by the elimination of water. *See* Acid.

Anhydrite. Natural anhydrous sulphate of calcium. It occurs like gypsum in beds and nodules, usually in association with red sediments and salt-deposits, such as those of the Trias, which indicate arid climatic conditions. Formerly little used, anhydrite now enters into the manufacture of sulphate of ammonia for use as a fertiliser.

Anhydrous. Term applied to a substance with no water in it. A crystal with no water of crystallisation is said to be anhydrous.

Sulphate of calcium exists naturally in an anhydrous form as anhydrite, the variety containing water being gypsum or selenite. *See* Crystallisation.

Ani. Ruined city, in the 10th century the capital of the Bagratide kings of Armenia. It is in

the Turkish vilayet of Kars, about 25 m. S.E. of Kars. It was destroyed by Seljuks in 1063.

Ani, Papyrus or. Finest extant example, 78 ft. long, of the Egyptian Book of the Dead. Made in honour of a Theban scribe Ani about 1500 B.C., its magnificently coloured vignettes, now in the British Museum, depict the ceremonial at an Egyptian funeral. A papyrus in Cairo Museum contains the paternal precepts of another scribe Ani of about 600 B.C. *See* Book of the Dead.

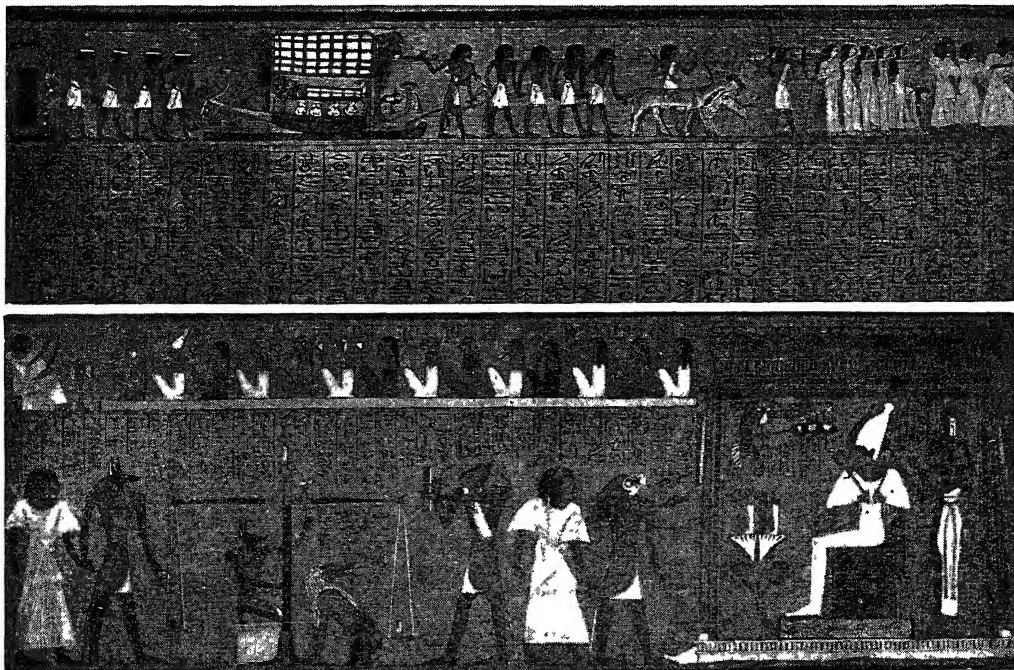
Anie, Pic d'. A peak of the Pyrenees in France. It is a sacred mt. of the Basques, 8,215 ft. high.

Aniline (Arab. *annil*, indigo) ($\text{C}_6\text{H}_5\text{NH}_2$). Colourless oily liquid used as the starting point in the manufacture of a series of aniline dyes. It was discovered by Unverdorben of Erfurt in 1826 among the products obtained by the distillation of indigo, and named by him *krystallin*. Runge in 1834 obtained it from coal-tar oil, and named it *kyanol* on account of the azure-blue colour it gives with bleaching powder. Fritzsche in 1840 obtained an oil by distilling indigo with caustic soda, which he designated *aniline*. Hofmann examined these three products and found them identical. He proposed to call the chemical

phenylamine, but amidobenzene was adopted as the scientific name. Perkin in 1856 first obtained mauve from aniline, and this laid the foundation of the aniline colour industry, which has now reached enormous proportions. Aniline is made by the reduction of nitrobenzene with iron and hydrochloric acid, or by the action of ammonia on chlorobenzene. The three qualities of aniline made are pure aniline oil, aniline for red, and toluidine. By boiling aniline with glacial acetic acid, the product acetanilide or antifebrin, used in the treatment of headache, is obtained. Aniline combines with acids to form well-crystallisable salts, one of these, the hydrochloride, being prepared on a large scale and known commercially as aniline salt ($\text{C}_6\text{H}_5\text{NH}_2\text{HCl}$). It is used by calico printers for aniline black. Some of the aniline or coal-tar dyes are employed in medicine. *See* Dyes.

Animal (Latin, living being). Scientific name for all living creatures except plants. The popular restriction of the name to mammals as distinguished from birds, fishes, etc., is erroneous.

A living creature may be defined as an organism which exhibits five forms of activity—movement, sensation, nutrition, growth, and



Ani. Portions of the magnificent papyrus made in honour of the Theban scribe Ani about 1500 B.C. This papyrus is the finest known example of the Egyptian Book of the Dead. The upper part shows a funeral procession, and the lower the weighing of the soul before the judgement seat. The original is in the British Museum

reproduction. It moves by its own impulse, not as the mere vehicle of some force or impulse from without. It possesses the power of sensation, or irritability in the widest sense of the word, and responds by contraction or otherwise to the impact of external objects or forces. It feeds, or takes in nutriment, which is assimilated and becomes part of its own tissues, to repair a waste that is continually going on as the result of activity. It grows by this process of assimilation of food, and it possesses organs of reproduction.

The world of animate or living matter is divided into two great kingdoms, the animal and the vegetable, the former the subject of zoology, and the latter of botany. Animals and plants are alike in fundamental structure, and may be said to form two divergent branches of the one tree of life. Both transform nutriment by a process of digestion into tissue; but while plants assimilate the nitrogen and carbonic oxide in the air and build up their tissues by absorbing mineral salts from the soil, animals can assimilate these chemical elements and compounds only after they have been transformed into organic compounds by the plants. In other words, plants are the great food producers and animals are the consumers, an equilibrium being maintained by their joint action.

Grouping of Animals

Animals are grouped according to anatomical structure. A porpoise looks like a fish, but on examination is found to be altogether different. It has the internal structure of a land animal, breathes with lungs, is warm-blooded, and suckles its young. It is therefore a mammal and not a fish. The eel looks like a snake, but its anatomy proves it to be a fish. The bat flies like a bird; the platypus lays eggs like a bird; yet their internal structure shows them to be mammals. The same principle applies when we come to the minor divisions of the animal kingdom. Two animals that look alike may be separated by some important point of internal structure. Conversely, animals of very different outward appearance may be almost identical in internal structure.

The classification of animals begins with the grouping of individuals into species, species into genera, genera into families, and these again into orders, classes, and phyla—divisions of increasing importance and size.

The domestic dog may be taken by way of illustration, and in tracing its classification one may conveniently start with the phylum and work down to the species. Being a backboneed animal, it belongs to the phylum *chordata*: the fact that it suckles its young places it in the class of *mammalia*. Mammals with sharp, recurved claws, powerful tearing teeth or canines, and cutting teeth well adapted to a flesh diet, form the order *carnivora*. This is divided into a number of families, such as cats, dogs, weasels, and bears. Taking one of these families, the dogs or *Canidae*, we find that there are four genera. In the first of these, the genus *Canis*, there are between thirty and forty different species, of which the domesticated dog is one. It is therefore known zoologically as *Canis familiaris*, the first being the generic name and the second the specific.

The animal kingdom is divided primarily into three unequal sub-kingdoms: *Protozoa*, *Parazoa*, and *Metazoa*, comprising between them ten great phyla. The first and second sub-kingdoms each consist of a single phylum, the *Protozoa* and *Porifera*, respectively animalcules and sponges; while the third sub-kingdom contains all animals more highly organized than sponges. The first and second sub-kingdoms and the majority of phyla constituting the third, *viz.* phyla containing animal types like worms, crabs, spiders, scorpions, insects, shell-fish, cuttlefish, starfish, and sea-urchins, are *Invertebrata*. The remaining animal types of the *Metazoa* sub-kingdom, *viz.* fishes, amphibians, reptiles, birds, and mammals,

are *Vertebrata*, or, more correctly, *Chordata*.

It is clear that the term phylum does not possess equal significance throughout the animal kingdom, for the backboneed animals constituting the single phylum *Chordata* are of supreme importance. The ten great phyla are as follows:

1. *Protozoa* (animalcules). Comprises the simplest and lowliest form of animal life and includes many disease-producing blood parasites such as *Plasmodium*, the organism of malaria.

2. *Porifera* (sponges).

3. *Coelenterata* (jelly-fish, corals, sea-anemones).

4. *Platyhelminthes* (flat worms). Most members of this group are unsegmented parasites, tapeworms and flukes, chiefly notable as sources of disease.

5. *Nematoda* (round worms). Chiefly parasites of economic and medical importance, such as the tropical guinea worm.

6. *Annelida* (ringed worms). Includes a vast number of marine worms, as well as earthworms and leeches.

7. *Arthropoda* (jointed-limbed animals). Includes crabs, scorpions, and spiders, centipedes, millipedes, and insects. This phylum has by far the greatest number of species, as well as most numerous individuals.

8. *Mollusca* (shell-fish and cuttlefish).

9. *Echinodermata* (starfish and sea-urchins).

10. *Chordata* (backboneed). The highest animals are included here. They range from the *Balanoglossus* (acorn-worm), a small creature found in the sea, and the sea-squirt, through fishes, amphibians, reptiles, and birds, up to mammals. These last consist of several groups, of which one, the *Eutheria*, is divided into sixteen orders. At the head of these sixteen are the *Primates*, consisting of men and anthropoid apes.

Bibliography. Animal Biology, L. L. Woodruff, 1938; Animals, T. H. Savory, ed. F. H. C. Butler, 1942; Animal Biology, A. J. Grove and G. E. Newell, 1942; Outlines of Zoology, Sir A. Thomson, 9th ed., 1944.

ANIMAL: EMPLOYMENT IN WAR-TIME

Craven Hill, F.Z.S

An account of the many valuable ways in which the special powers and instincts of animals have been used by mankind in the waging of war, particularly during the two Great Wars of the 20th century

From the earliest times man has used the lower animals to help him in warfare. The numbers pressed into service increased with each large-scale conflict and culminated in the two Great Wars of this century when, in one military sphere or another, it is computed that at least 30,000,000 were employed. They included horses, dogs, elephants, camels, sea-lions, monkeys, ferrets, pigeons, white mice, and spiders.

During the Second Great War the number of "dumb" creatures employed was probably smaller

than in the First, for with modern warfare becoming more and more a contest of machines, the openings available to animals became more restricted. An obvious example is the war horse, now virtually out of business, the cavalry regiments having become to a large extent mechanised.

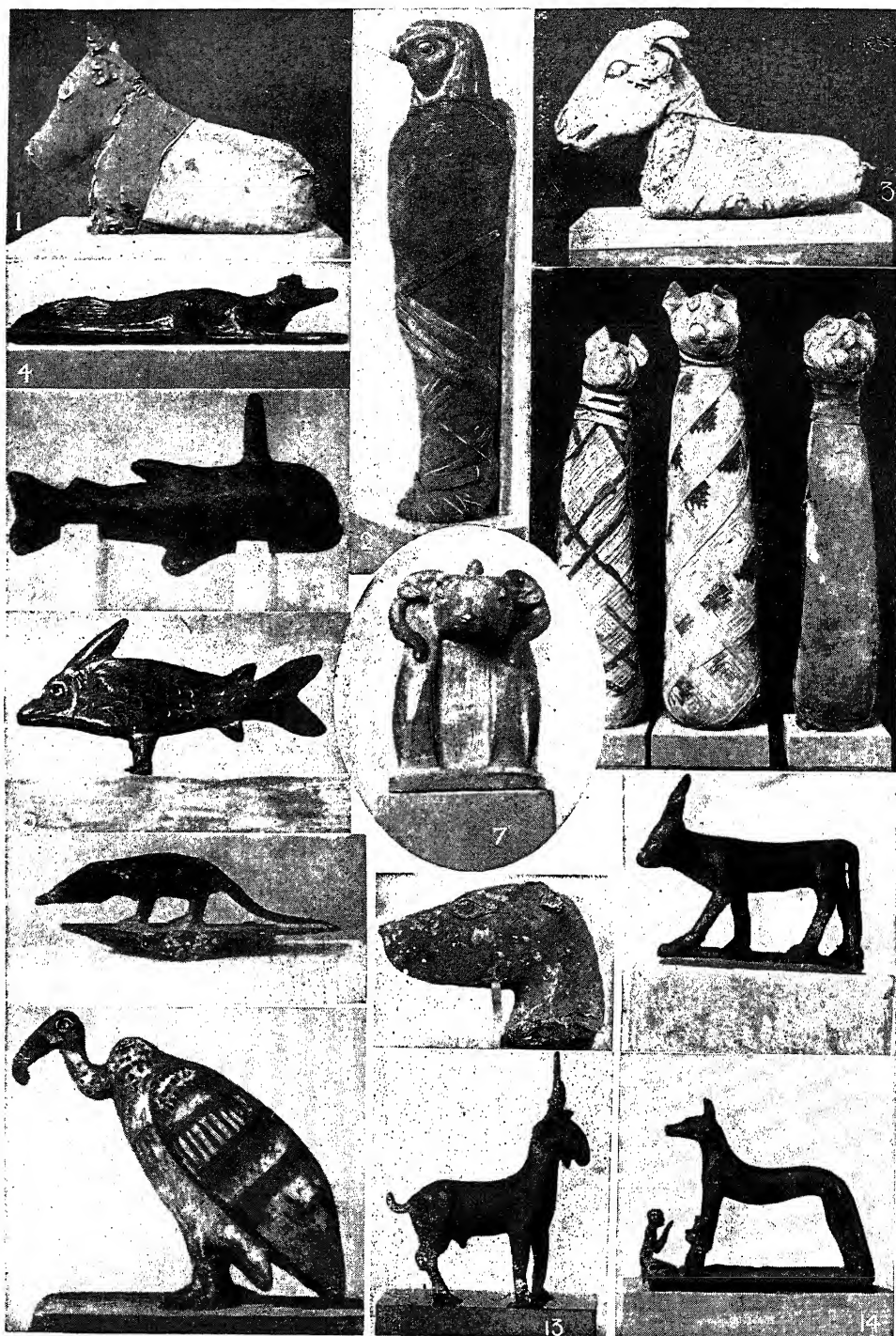
There are, however, still important rôles for the camel, the elephant, the white mouse, and even the spider to play. A flourishing camel corps attached to the Egyptian army is proof of the continued efficacy of an



VERTEBRATES shown in the upper portion to the left are birds—parrot and golden cranes, centre and right, mammals—lion, elephant, and chimpanzee; below them, reptiles and amphibians—crocodile and (round the tree) python, tortoise, turtle, lizard, toad, and frog; in the water are fish—salmon and lamprey, and in the corner sea-squirt

The INVERTEBRATES which are shown in the lower portion are, on the left, crab, snail, earthworms, spider, and brittle star-fish, with below the latter, common star-fish and sea-urchin, in the water are floating jelly-fish; while on the rock to the right is an octopus, with below it coral, four different kinds of sea-anemone and two sponge-

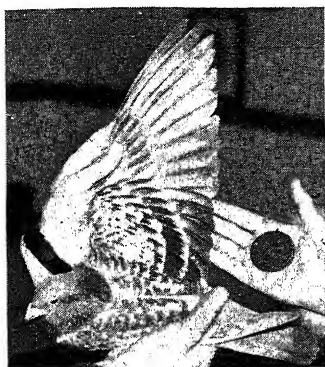
ANIMALS: REPRESENTATIVES OF THE TWO GREAT DIVISIONS OF THE ANIMAL KINGDOM



1. Mummified head and forequarters of a sacred bull
calf, Thebes. 2. Mummified hawk with bronze head. 3.
Mummy of a ram, Thebes. 4. Crocodile, sacred to Sebek.
5 and 6. Fish, sacred to Hathor. 7. Head of a ram, em-
blem of Ammon or Amen-Ra. 8. Cat mummies from

Thebes. 9. Shrew mouse, sacred to Horus. 10. Head from
the mummy of a dog, Thebes. 11. Figure of a cow, em-
blem of Hathor. 12. Figure of a vulture, sacred to Mut.
13. Ram of Khnemu. 14. Jackal, sacred to Anubis, with
a worshipping priest. (British Museum.) See p. 460

ANIMAL-WORSHIP: FIGURES AND MUMMIES FROM ANCIENT EGYPTIAN TOMBS



Animal. This pigeon, released from a crashed plane Dec., 1943, struggled clear of the oily sea, flew 120 miles to its loft, and thus caused an R.A.F. bomber crew to be saved. It received the P.D.S.A. medal

animal unrivalled for hauling or carrying rations, petrol, water, and ammunition between base areas where manoeuvrability is more important than speed. In India, and on the Burmese frontier, the elephant, now long withdrawn from the front-line service which his kind rendered to Hannibal, is today often used in rear areas for the transport of guns in difficult places, and for the drawing of timber and other heavy war material over country where no other animal or machine could go.

In both wars large numbers of white mice were kept in submarines, not only as mascots for the crews, but as never-failing indicators of air pressure and oxygen supply. The spider plays its part [in the optical industries of both Great Britain and the U.S.A., to spin silk for cross hairs on lenses, for surveying instruments, and for use in gun and bomb sights. Its silken strands are far finer than the finest line that could be etched on a lens by a diamond.

Sea-lions as Detectors

Sea-lions "served" for a brief period during the First Great War. On the suggestion of a young naval officer several were lent to the British government by zoos and circuses for special training, with a view to the detection of the presence of U-boats in home waters. The animals were put through a course of tuition on Lake Bala in N. Wales, where an attempt was made to teach them to break surface and bark vociferously on detecting underwater vibrations. Two or three specimens which passed the test were subsequently taken to the English Channel and the North Sea for service; but

they showed a tendency to chase the shoals of fish which had multiplied during the war. In 1917 the scheme was superseded by the hydrophone.

More efficient service was rendered in the First Great War by the ferret, which rounded up the rats that infested trenches and dug-outs of the Western front. Large numbers of ferrets were exported to the Continent expressly for this purpose, one Ashford (Kent) dealer sending out no fewer than 500.

Monkeys did much to help in meeting the menace of poison gas. Hundreds were commandeered for use along humanitarian lines in government laboratories, where their reactions to noxious gases proved of special value to those engaged on research. The animal most commonly employed was the Indian rhesus macaque, and at the end of the war the government were left with several hundred of these animals on their hands. Most of them found sanctuary in the London zoo.

In both wars pre-eminent service was rendered by pigeons and dogs, chiefly in the sphere of life-saving. During the First Great War over 100,000 pigeons were used by Great Britain. The total employed during the Second Great War, thanks to the large reserves bred by the National Pigeon Service, reached nearly a million, and most of them saw front line service. In 1942 almost 500,000 pigeons were being used in operational work by the R.A.F. alone, and nearly 2,000 went out each day with planes, usually two birds to each plane.

During a single eight-month period in 1942, 320 messages, a few of them S O S calls, were dispatched from aircraft by R.A.F. pigeons. Of these, no fewer than 307 were successfully delivered.

Operating from their mobile pigeon lofts (or, if used in planes, from wicker or metal containers), carrying vital maps, films, or dispatches in cylinders attached to their legs or backs, the pigeons conveyed messages innumerable. The speed at which the birds fly—often, with a tail wind to assist them, not far short of a mile a minute—resulted in the saving of countless human lives.

The Verdun Pigeon

Perhaps the most notable achievement of a pigeon in war was that of Cher-ami, a hen pigeon who saved the French from a German defeat at Verdun during the First Great War. Subjected to heavy fire and poison gas, and with their lines of communication broken, the beleaguered garrison sent out a message for help by the only bird left to them. Cher-ami set out amid gas and gunfire, reached her base, and within an hour relief was on the way. Cher-ami recovered from her wounds, and was returned in 1919 to the U.S.A., whence she had come. She lived only a short time there, but her body was mounted and placed in the Smithsonian Institute, Washington, D.C., where it still is today.

Notable pigeons of the Second Great War are the one that saved an entire bomber crew, brought down in the North Sea, and Percy, the pigeon hero of the Battle of



Animal. British war dogs hunting mines laid by the enemy in France, 1944. They proved almost as successful as any mechanical mine-detecting apparatus
Photo, British Official: Crown Copyright



Animal. Specially trained police dog searching for victims on a bombed site in London, 1944

Britain, who faced machine-gun bullets, cannon shell, and *flak*, to carry a vital message for the Army, an achievement which earned him a medal. Pigeons flying back to the U.K. from Holland in 1944-45 carried details of rocket-bomb sites. As a counter-measure the Germans employed falcons, but their success was negligible.

Great Work of Dogs

The nature of the war-time services rendered by dogs has undergone striking changes. Ancient Egyptian wall writing, probably dating as far back as 4000 B.C., depicts savage dogs straining on leashes held in the hands of Egyptian warriors and leaping on enemy soldiers. In Iraq, old Assyrian temple walls show bas-reliefs of battle dogs in action. Attila the Hun used a drove of huge dogs to stand as sentries around his camp, to guard him against any approaching foe; and Pliny refers to squadrons of dogs that fought in the ranks beside the Colephonians of Asia Minor against their Ionian enemies.

Since then dogs have seen service in almost every large-scale war. Between 1914 and 1918 they were most often employed as scouts and messengers. In the Second Great War they were trained mainly to guard aircraft works and other vital centres of production. But a certain number saw service in the front line, e.g. those used by Allied forces in France after D-day to locate buried mines, and the "anti-tank" dogs used by Russian troops on the Kalinin front.

Alsations. The animals used by the Civil Defence, London Region (the only area in the country in which rescue dogs were officially used), totalled 18, 15 being Alsations. The exceptions were a border collie, a Labrador, and a Boxer.

The dogs, all about 3 or 4 years of age, were obtained from the public and trained in London. When schooled in their work they were sent to four depots (Chelsea, Lewisham, Hendon, Loughton), where they operated in pairs, each pair under its own trainer.

On orders from Group H.Q. they were taken to flying-bomb and rocket incidents involving substantial demolition of houses, and there, by their behaviour, quickly indicated to their trainers whether any human victims still lay buried beneath the debris.

The dogs located not only living victims but also dead persons. If a living victim lay buried, the animals would show every sign of impatience to reach him, and the rescue work was accordingly maintained until the casualty was released. If the victim were dead the dog would indicate this fact, known to him apparently by some sixth sense, by remaining steadfastly at the scene. One Alsatian bitch alone located 21 living people. It is estimated that the rescue dogs altogether were instrumental in saving the lives of over 45 living casualties, and in locating 480 dead. The animals answered 192 call-outs between Oct., 1944, and March, 1945.

The intuition possessed by some of these hardworking animals was often quite uncanny. In one

These, working in groups of 50, were trained to carry bombs to enemy tanks, and did in fact obtain many knock-outs. But casualties among them became so high that their use was abandoned. In Oct., 1944, another entirely new and most significant opening was found for canine service, that of assisting the rescue services operating at bomb incidents. The rescue trait is deeply ingrained in most dogs, particularly

incident involving the complete demolition of a butcher's shop, the dogs refused to be put off the scent by the stocks of meat which lay buried, and successfully guided the rescue services to the injured butcher himself.

The notable services rendered to man by his so-called "dumb" friends are not forgotten. After the First Great War monuments to the animals were erected in most European countries, some of them quite imposing. Those erected in Great Britain include the Scottish national war memorial at Edinburgh Castle, which has, both carved in stone and represented in glass, a pageant of animals, in which are represented horses, mules, donkeys, dogs, camels, oxen, elephants, and reindeer (2,000 reindeer served in Archangel in 1918-19, with Lapps as drivers), pigeons, and mice—even canaries, which had proved invaluable to sappers in their task of tunnelling underground.



Animal Intelligence. Chimpanzees give remarkable evidence of a reasoning intelligence. 1. One fits a stick into a hollow cane to make a rod long enough to reach an objective. 2. Another has piled up boxes for the same purpose
From "Mentality of Apes,"
by Prof. W. Köhler

ANIMAL INTELLIGENCE AND INSTINCT

R. I. Pocock, F.R.S., Supt., Zoological Gardens, London, 1904-23

The reading of this discussion of an interesting subject should be supplemented by reference to the articles on Ant; Dog; Horse; and other insects and animals that display intelligence of any kind

Intelligence has been defined as "quickness of mental apprehension": and this is perhaps the meaning most commonly attached to the word. In animals it is usually measured by aptitude for learning under training or by readiness in finding out things for themselves. In reality, intelligent behaviour is manifested by the originality of the actions concerned, and by the individuality displayed in dealing with novel conditions. This conception of intelligence serves to distinguish it from instinct.

But the study of the subject is beset with difficulties. That rapidity of response to tuition is an untrustworthy criterion of intelligence is illustrated by domestic cats, which, contrary to prevalent opinion, are probably as intelligent as dogs. The comparative difficulty in training cats is

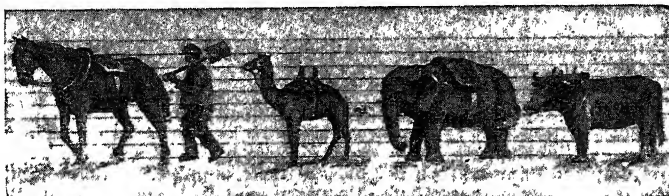
ing, which have been inherited almost unchanged from a wolf-like ancestor, may be cited. Similarly, when deer and antelopes learn to push back the sliding doors of their sheds, we call their behaviour intelligent. But the action has its basis in the instinct of these animals to use the horns or muzzle to brush aside natural obstacles like branches. A more complex example of instinct-adaptation is illustrated by the story of a cat which habitually gained admission to a house by pulling a bell with its paw. But cats of all kinds instinctively use their paws for a variety of purposes, such as cleaning the face, playing with prey, reaching food, and so forth: and although we cannot know how far the animal in question understood the sequence of events connecting the pulling of

selected specimens of different kinds, Prof. Watson completely failed to teach them to use a crooked stick to secure grapes hung out of reach of their hands, or to push or pull bananas from a glass pipe fixed to the floor of the cage. The reputation for high intelligence enjoyed by monkeys and apes seems to be due in a great measure to their likeness to human beings in structure and behaviour, and to the comparative ease with which, owing to their possession of hands, they can be taught to perform essentially human actions. There is certainly much to be learnt about the mental processes of these animals; but it does not yet appear that they can be placed definitely on a higher intellectual plane than dogs or elephants.

Stories of the intelligence of these two groups of animals may be found in all books dealing with the subject. One instance attesting the intelligence of elephants may here be told. In the Zoological Gardens, in London, the elephants have found out that the way to obtain a piece of food that has fallen within the hand-rail beyond the reach of their trunks is to blow it back beneath the rail to the person who dropped it. This behaviour seems to show intelligence of a tolerably high order. A low order of animal intelligence is attested by the story of the pike which took three months to learn to abstain from charging a glass partition separating him in an aquarium from some small fishes which he wished to eat at the time, but which at the end of that period and thereafter he refrained from attacking, despite the removal of the partition.

Animal Magnetism. Name which was formerly given to hypnotism under the impression that its phenomena were due to magnetic influence proceeding from the operator to the subject. It has no connexion with the electrical phenomena which often occur in the living organism. See Hypnotism.

Animal Power. Standard of work which certain animals can perform. Many tests have been made to establish the amount of power which animals of various kinds can exert for considerable periods. Watt estimated that a horse of average strength could do work equivalent to raising 33,000 lb. one foot per minute (33,000 foot-pounds). In practice this is too high for a ten hour working day, 22,000 ft.-lb. being about an average, but the figure of 33,000 has been adopted as the standard



Animal Power. Sketch illustrating the comparative pulling power of man and certain animals. While a man can pull .8 to 1.166 lb. for each pound of his own weight, an elephant pulls only .729 lb. for each pound of its own weight; thus, relatively, a man is stronger than an elephant

doubtless due, not to stupidity, but to independence of character or unadaptability of temperament. It is not always easy, moreover, to decide whether behaviour is dictated by instinct or intelligence. The cunning of wolves in avoiding traps is generally, and possibly rightly, assigned to intelligence, on the tacit assumption that snares are too recent an invention to be regarded as a part of the natural surroundings of these animals. But since wolves have been trapped by mankind for thousands of years, it may be that their caution is, at all events partly, instinctive, for instincts may be perfectly or imperfectly developed.

Again, many alleged intelligent actions of domesticated or captive animals, living under conditions providing factors foreign to their natural mode of life, are either the direct outcome, or slight modifications, of simple instincts. The wariness displayed by elephants when testing the strength of a bridge, and the attitudes of sporting dogs, called setting and point-

ing the bell with the opening of the door, it was probably only to a very limited extent.

Quite commonly animals have gained a fictitious reputation for a comparatively high standard of intelligence owing to misinterpretation of their behaviour. Under natural conditions the lives of many vertebrate animals depend upon their rapidity of response to the slightest movement or sound. They are, therefore, exceedingly quick at detecting and acting upon signs from their trainer which are likely to pass unnoticed by on-lookers. In that innate faculty probably lies the explanation of the alleged spelling and counting capabilities of horses and dogs. When the required letter or number is touched, a slight, possibly unconscious gesture of the showman may serve to apprise the animal that the correct selection has been made.

Carefully conducted experiments have also thrown doubts upon the reputed high intelligence of monkeys. After hundreds of trials with



horse-power by which engines are rated. Comparisons between elephants, horses, camels, and men, as regards their tractive power, carried out under scientific conditions at Barnum and Bailey's circus in New York, showed that for every pound of its own weight an elephant pulled .729 lb.; a horse, .822 to 1.172 lb.; a camel, .764 lb.; a man, .8 to 1.166 lb. These figures relate, however, only to short periods of maximum effort.

An ox is considered to have $\frac{2}{3}$ the strength of a horse; a mule about $\frac{1}{2}$; a man $\frac{1}{3}$ to $\frac{1}{4}$. Proportionately to weight, strength tends to increase with decrease of size. Small animals, such as weasels and rats, also birds and fish, are enormously strong for their weight. Insects again display even more extraordinary power. A flea is able



Animal-worship. Old Egyptian figures showing a king making an offering to the sacred bull, Apis. Above: Snake-worship in India

to jump 500 times its own height, and an ant carries several times its own weight with the greatest ease. See Horse Power

Animal-worship. Term loosely denoting a complex range of ritual cults which have their roots in animism and their survivals in folklore. The assumption of identical qualities in the human and the animal soul, fortified by the primitive belief in transmigration, led to a uniform treatment of the dead. Hence emerged in one direction the various forms of ancestor-worship, and in another those of animal-worship. At first a whole species may have been revered or feared; in process of time individuals were chosen for their rarity, as the Siamese white elephant, or expressly

reared under conditions of sanctity, as the Egyptian Apis. It is possible that animal-worship may be the primary origin of animal domestication.

Functionally, beast-cults are related to the chief material concerns of their worshippers. The nomad hunters of N. Asia reverence the bear, many American Indians the deer. The pastoral races of the ancient Nile valley and of Aryan India paid divine honours to the cow. Dangerous animals are propitiated in the case of the leopard (W. Africa), lion (Bantu Africa), tiger (S E. Asia), hawk (N. Borneo). A potent motive for the reverential cult of animals



Animal-worship. The sacred cow of Benares, and other protected animals, by a statue of one of the sacred beasts

Drawing by F. Maiana

is their supposed kinship with men as tribal ancestors in the communion of the totem. The eagle-hawk and crow are not only phratry or tribal names in many Australian tribes, but are the subjects of a copious mythology. Under polytheistic forms animal-worship reaches its most systematic development in Hinduism. See Totemism; consult also Herbert Spencer's Essays, Vol. III, Origin of Animal-worship; Lang's Magic and Religion, 1901; Farnell's Evolution of Religion, 1905.

Animé. Resin which exudes from the bark of *Hymenaea courbaril*, a huge tree of tropical S. America. It is used in perfumery and in making plasters, and is supposed to take its name from its power of attracting living creatures.

Animism (Latin *anima*, soul). Belief in spiritual beings, which is the philosophic groundwork of all primitive culture. It should be distinguished from animatism, which attributes to natural objects and phenomena personal will-power, apart from a separate soul. It may be argued that man laid the foundations of an explanation of nature by subconsciously regarding the moving objects around him—wind, river—as possessing a volition like his own, and thus as

being alive. Later on he would draw from the observed facts of dreams and of unconsciousness, visible breath and ill-health, reflected images in water and shadows, the notion of a spirit-self—it might be more than one—separable from the body. This recognition of the human soul and its extension to all other sensible objects are the material of what E. B. Tylor, taking over the term from G. E. Stahl, who used it of vitalism, called animism.

By the side of the belief in human personality there emerged another, not necessarily as an inference—the belief in an after-life of the soul, for a time at least. The spirit or breath of the dead became a ghost, the shadow of the dead a shade. That this was perceived by early palaeolithic man in Europe is attested by the careful interment of the dead, and the provision of choice amulets and tools for their ghostly service. From this point animism as an effort of the mind began to influence the emotional life. While, therefore, the primitive religions may not be the direct offspring of animism, they arose at any rate in an animistic atmosphere. The lines of development follow a threefold path, deducible from the foregoing. (1) The soul's after-life suggested the cult or tendence of the dead, which became the worship of disembodied spirits credited with objective powers. (2) The contemplation of the power manifest in phenomena resulted, not necessarily later in time, in nature-worship. (3) The conception of bodiless spirits led to devices for their propitiation, which widened into spirit-worship.

-To the savage mind a spirit may be a thing of mystery, but not an abstraction, as when the natives of Danger Island, in the Indian Ocean, employ rope nooses as traps for errant souls. Moreover, not all spirits are traceable to a material home, while many are conceived as able to enter at will different kinds of bodies, human, animal, or inanimate. They are thus often creatures of the imagination rather than objective ghosts, and by association of ideas are regarded as controllable by the principle of similarity. Out of the one grew the primitive belief in transmigration; out of the other, sympathetic magic. This brought about the separation of a special class of men, often exercising psychic powers more or less consciously, who as medicine-men or witch-doctors practise the arts which culminate in shamanism. So also

the individual attitude towards a subservient spirit or tutelary genius diverged in Africa into fetishism, and in Australia and Polynesia is illustrated by ideas connoted respectively by the *chunnga* and *mana* (*q.v.*).

Through these primal beliefs runs the idea of communion with a friendly, or at least a placable, unseen world. Some have held that a still more primitive movement of the mind was instigated by fear. When all was well, human nature may in all ages, as to-day, have been content with the unthinking acceptance of the material life; when calamity befell such thoughts began to emerge as led to propitiation by sacrifice. This involves the consideration how far the "god-idea" may have arisen independently of the "spirit-idea." While it cannot be asserted that the conception of a Supreme Being is



Anise. The star anise from which much of the oil used in medicine and for flavouring is obtained

inherent in all savage minds, some interesting conclusions are deducible from the aboriginal beliefs of the Australians, Bushmen, and Fuegians, who represent at the southern extremities of the continental masses the still lingering relics of earliest man. We are on surer ground when considering the clear distinction made in early ages between good and evil spirits. The effort to avert the malevolence of malignant spirits as the producers of disease, either through demon-possession or hostile witchcraft, led to exorcism.

There is little, if any, moral element in animism. The belief that the after-life is determined by the ethical acts of the present belongs to a higher stage. Among animistic peoples ethics is essentially obedience to tribal law. It was after religion had come to exert a more peremptory hold on the attitude of the individual

soul that to customary law it added sanctions based upon the fear of subsequent retribution, or the expectation of ultimate reward. The great non-Christian theisms have offered the world lofty philosophies, but their votaries still for the most part maintain in time of calamity their primal animism. Thus while Australia and Polynesia, Melanesia and non-Moslem Africa may be classed in general terms as animistic, the mongoloid peoples of Eastern Asia maintain ancestor-worship as their operative religion. Even Hinduism itself, polytheistic though it be in form, is at heart a highly systematised animism. See Anthropology; Spiritualism.

B. G. Harmer
Bibliography. Golden Bough, J. G. Frazer, 1890; Origin and growth of the Conception of God, E. Goblet d'Alviella, 1892; Myth, Ritual and Religion, A. Lang, new ed., 1899; Threshold of Religion, R. R. Marett, 2nd ed. rev. 1914.

Anio. River of central Italy. A tributary of the Tiber, which it enters 2 m. above Rome, it rises in the Herminian Hills, flows W. past Tivoli, where it forms famous falls, and has a length of about 70 m. Known also as the Teverone, or Little Tiber, and Aniene, it supplied ancient Rome with water by two aqueducts.

Anion (Gr. *ana*, up; *ion*, going). Name applied by Faraday to the product of electro-chemical decomposition which appears at the anode or positive pole of the battery. That which appears at the cathode or negative pole is called the cation. See Electrolisis.

Anise (*Pimpinella Anisum*). Perennial herb belonging to the widespread family Umbelliferae. Anise is a native of Greece and other parts of S. Europe. It has leaves cut into lobed or toothed leaflets, and minute white flowers; as with all umbelliferous plants, the little fruits are pierced with tubes filled with an aromatic essential oil. The fruits, the aniseed of commerce, are used as a flavouring in confectionery, and the oil extracted is used in medicine as a remedy for flatulence and dyspepsia. Much of the commercial oil of anise is obtained from the fruits of star anise (*Illicium verum*), an evergreen shrub of the order Magnoliaceae and a native of China and Japan.

Anjengo. Village in the state of Travancore, India. On the coast, 78 m. N.W. of Cape Comorin, it was one of the earlier English settlements in India, being occupied by the East India Company in 1684. Although enclosed within the state of Travancore, it was a British settlement until 1947.

Anjidiv OR ANJADIVA. An island off the W. coast of India, forming a dependency of the Portuguese settlement of Goa. It is 1 m. long, and was the first piece of territory in what is now the Bombay Province to fall into Portuguese hands.

Anjou. Old province of France. It lay around its capital, Angers, on the Maine, a tributary of the Loire, and came into existence in the 7th or 8th century. In the 10th century it was ruled over by Fulk, founder of the warlike family of the counts of Anjou. One of these counts, a later Fulk, carried on a war with Henry I of England, but in 1129 Henry's daughter Matilda married Fulk's son Geoffrey, first of the Plantagenets.

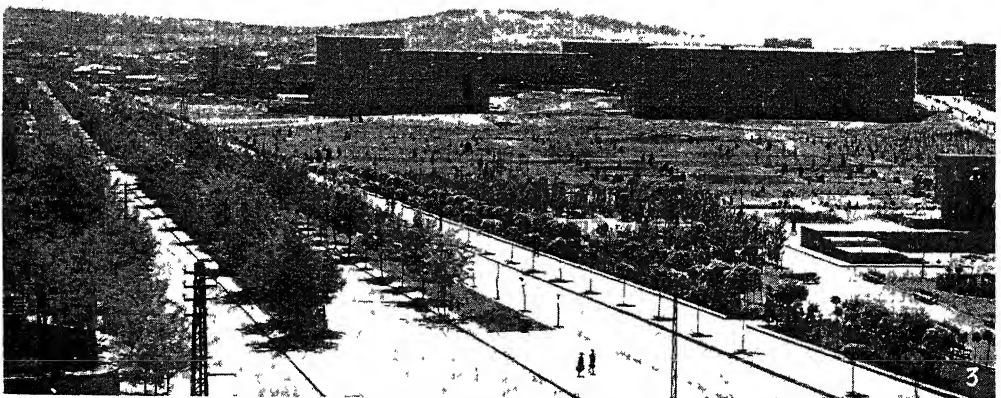
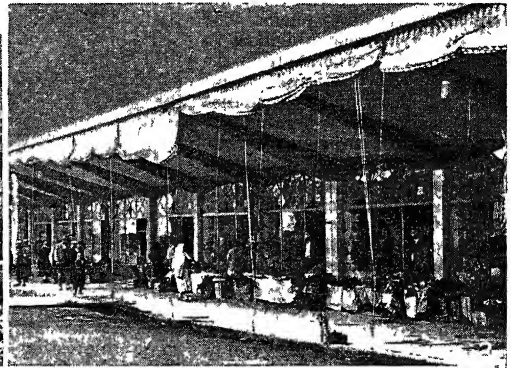
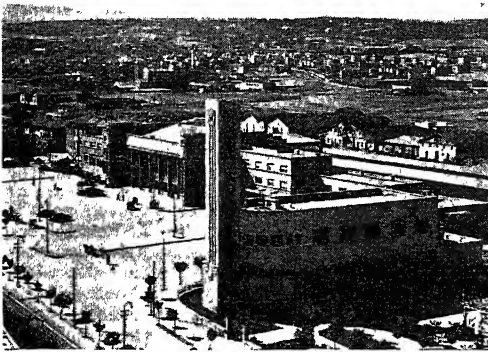
Henry II of England was the son of this marriage, and he was in turn count of Anjou. His son John lost Anjou about 1203, when it was seized by Philip Augustus of France, and henceforward it belonged to his successors, except when, during the reigns of Henry V and Henry VI, it was again an English possession. It was finally recovered by France about 1444.

In 1360 the count was made a duke, and in the 15th century Anjou had a period of glory under Duke René. In 1584 Anjou passed under the direct rule of the kings of France. It was included for a time with Orléannais, but in the 17th century was a separate province. Since the Revolution it has formed the department of Maine-et-Loire and part of the departments of Indre-et-Loire, Mayenne, and Sarthe. See France: History.

Ankara. Capital of the Turkish republic. In the vilayet of the same name, it stands on the left bank of the Enguru Su, 215 m. E.S.E. of Uskudar by the Anatolian Rly. Before becoming the capital on Oct. 13, 1923, it was generally known in Europe as Angora. It was a sleepy provincial town in a barren and malarial plain when Kemal Atatürk (*q.v.*) decided to move the centre of administration from Istanbul to a place strategically safer. Ankara is somewhat inaccessible, though there are rly. services to Kayseri, Erzincan, and into Armenia, and air routes to Cairo, Istanbul, and beyond.

Rebuilt almost entirely since its change of status, Ankara has been called the most expensive city in the world. The practical and severe modernity of the many embassies, government buildings, and residences shows the hand of German architects and engineers who were called in to help to construct a typically European capital. Yenishehr, the modern part of the city, has broad boulevards and spacious parks, as well as factories, mills, power stations, and drainage and sewage systems. The old quarter is interesting historically, with remains of Roman and Byzantine occupation. A large bronze equestrian statue of Kemal stands overlooking both the old and the new districts. Ankara is the second largest city of Turkey: pop. (1945) 227,505. The industries include agriculture, goat breeding, and cloth working. Wool, mohair, grain, honey, and fruit are exported. There is a permanent exhibition in which Turkish products are displayed.

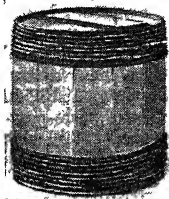
Captured at different times by Persians, Arabs, Seljuk Turks, and



Ankara. The capital of Turkey, inaugurated by Kemal Atatürk, is an interesting example of modern large-scale city building. 1. The railway station. 2. The bazaar, a survival of the oriental element of what was formerly a quiet provincial town. 3. Government buildings seen across one of the new boulevards

Latin Crusaders, the city fell to the Ottoman Turks in 1360. Tamerlane the Tartar defeated and imprisoned the sultan Bayazid near here in 1402, but Mohammed I recovered the place in 1415, since when it has remained Turkish. In 1832 it was momentarily seized by Egyptians under Ibrahim Pasha. The Turkish nationalist movement chose it for headquarters in April, 1920. Shocks were felt here during the great earthquake to the E., Dec. 27-28, 1939, and it was here that relief measures were organized.

Anker. Old Dutch measure of liquid capacity. Formerly used in England, when it contained ten gallons of wine, it is still used in S. Africa, equalling 7½ gallons.



Anker. Old Dutch liquid measure

Anker-Larsen, JOHANNES (b. 1874). Danish novelist and dramatist. Born at Lange-lund, Sept. 18, 1874, he became a student of theology and law, but was attracted by the stage and worked his way as an actor for eight years, eventually holding the post of stage director in various theatres. With this career he combined journalism and a considerable output of plays and novels. He won the Gyldendal prize for literature with his *De Visers Sten* (The Philosopher's Stone) in 1923. Other translated works include *Martha and Mary*, *With the Door Open*, and *A Stranger in Paradise*.

Ankh. Ancient Egyptian symbol resembling a loop surmounting a T. From its use at coffin ends under the 1st dynasty, it is now recognized as having originated as a sandal-string. As its name resembled that of life it became the symbol of life, and as such is depicted in later ages in the hands of gods. By local association it became among the early Coptic Christians the sign of the cross.



Ankh

Anklam. Town of Pomerania, Germany. It stands on the Peene, 5 m. from the Baltic and 52 m. by rly. N.W. of Stettin. It has a military academy, some ship ping trade, and shipbuilding, linen woollen, and sugar industries. An old town, it has a church dating from the 12th century. Formerly an important fortress, it belonged to the Hanseatic League and later to Sweden, passing to Prussia in 1720. Pop. 14,789.

Ankle. A hinge joint of the human body, scientifically known as ginglymus. The articulation takes place between the two bones of the leg, the tibia and fibula.



Ankle. An indication of the way in which its bones connect the foot with the leg

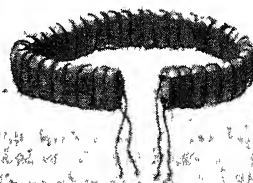
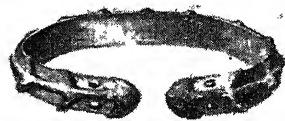
which are firmly united at their lower ends by ligaments, and the upper surface of the astragalus or ankle bone. It is a joint of very great strength owing to the ligaments which surround it and the close interlocking of the bony surfaces, the ends of the leg bones being prolonged down on each side to form a hollow resembling a mortice into which the astragalus fits.

Injuries of the ankle are sprain, dislocation, and fracture of the bones forming the joint. Sprain is usually due to twisting or wrenching the foot in a fall or "stepping over," and is accompanied by pain and swelling of the joint and sometimes discoloration of the skin if the blood-vessels have been injured. The treatment is to apply cooling lotions for a few days while the symptoms are acute and to keep the foot at rest, but as soon as the pain and swelling have sufficiently subsided gentle massage should be begun and movements of the joint made in order to prevent adhesions being formed and permanent stiffness resulting. Dislocation of the ankle joint is frequently associated with fracture of the lower ends of the bones of the leg owing to the close interlocking of the various bones. Fracture is particularly likely to occur with lateral dislocations. Backward dislocation of the astragalus usually results from a fall on the feet while running or jumping, or sudden violence applied to the leg while the foot is fixed, and may be associated with fracture of both bones of the leg. Dislocation forwards is very uncommon. Fracture dislocation of the ankle necessitates skilled surgical treatment.

Disease of the ankle is most frequently tuberculous, a pulpy swelling gradually involving the whole region of the joint, with impairment and eventually loss of movement of the foot. The treatment is to give the joint complete rest for a prolonged period either by the application of splints or, and often preferably, by encasing it in plaster of Paris, simultaneously taking measures to build up the general constitution of the patient. Surgical treatment may be adopted in appropriate cases. See *Anatomy: Man*.

Ankleswar. Town of Bombay prov., India. It is 5 m. by rly. S. of Broach and has cotton and paper mills.

Anklet. A ring worn upon the ankle as a bracelet is on the wrist. It is specially in favour with the



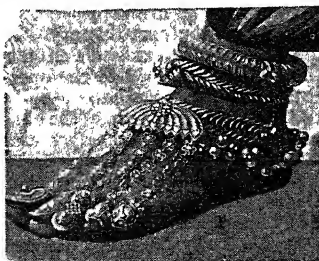
Anklet. 1. Of brass, worn by women of Torres Straits islands. 2. Of seed pods, worn by S. African natives

British Museum

peoples of Asia, Polynesia, and Africa. Anklets are made of metals, glass, and also of textiles and woven grasses. Asiatic dancing girls often have small bells attached to their anklets, while some African tribes wear anklets of spiky grasses as a protection from snakes. See *Charm*.

Ankober. Town of Abyssinia. The former capital of Shoa, it stands 8,700 ft. high on the E. slope of the Shoa plateau, and is 90 m. N.E. of Addis Ababa. It is now a hut village on the trade route. Pop. 2,000.

Ankylosis. Partial or complete fixation of a joint resulting from inflammation following disease or



Anklet. Foot of an Indian princess, illustrating use of anklets

injury. The new tissue which is formed and unites the bones may be either fibrous or bony. Where only a small amount of fibrous tissue has been formed, the condition may be improved by massage, exercises, or breaking down the adhesions by forcible extension of the joint under an anaesthetic. Severe cases may require a surgical operation. *See* Ankle.

Ankylostomiasis (Gr. *ankylos*, hooked; *stoma*, mouth). Disease, characterised by progressive anaemia, due to a parasite which occurs in two forms, the *Ankylostoma duodenale* and the *Necator americanus*. Of the two forms the former is not limited to the Old World and the latter is said to be commoner in India than in the New World.

The parasite is a worm, the male being about 7 to 11 millimetres in length and the female about 10 to 18 millimetres. The American form is shorter and thinner.

The disease is widespread in tropical and sub-tropical countries, e.g. Egypt, South America, Central America, southern parts of N. America, China, Japan, Italy, and parts of Australia. The fertilised eggs pass out from the bowel and incubate in the moist soil. Early in their larval development the parasites become infective and regain entrance to humans through the skin, moving about the body by regular channels until they reach the intestine, where they develop to maturity. Two sets of symptoms are present in hookworm infestation: by the larvae (itching or burning at the points of skin penetration, or sickness); and by the adult parasite (varying degrees of anaemia).

Treatment is of a dual character: to expel the worms and to restore the blood level to normal. Large doses of iron and a well-balanced diet are essential, while anthelmintic drugs such as thymol, carbon tetrachloride, tetrachloroethylene, or hexylresorcinol may be employed.

Anna (Hindustani, *ana*). Coin of India and Pakistan, the sixteenth part of a rupee. It is about equivalent to a penny, and is divided into four pice, or 12 pies. The British in India also used the word to denote a fraction. *See* Rupee.



Anna. Left, Pakistan (obverse); right, Indian (reverse).

Annaberg. Town of Saxony. In the Erzgebirge, near the frontier of Bohemia and 18 m. by rly. S.S.E. of Chemnitz, it has manufactures of lace and trimmings, industries introduced by Barbara Uttmann and extended by refugees from the Netherlands. In the 16th century it was an important mining centre, but the mines are almost worked out. Its 16th century church, S. Anne's, has interesting sculptures. There are monuments to Luther and Barbara Uttmann. The town was founded in 1496.

Anna Christie. Play by Eugene O'Neill (*q.v.*). Written 1920 and produced at the Vanderbilt Theatre, New York, 1921, and at the Strand Theatre, London, 1923, this strong human drama, which won the Pulitzer prize in 1922, concerns four characters, of whom the chief, Anna herself, is a waterfront prostitute. The others are her father, a Swedish-American sea-captain; a drab whom he keeps on his coal barge; and an Irish stoker. Pauline Lord appeared in the name part in the New York and London productions. Anna Christie was also adapted in two film versions. The first (silent) was made in 1924, with Blanche Sweet as the heroine. The second, 1930, was notable for providing Greta Garbo's first part in a talking film. She played Anna, with Wallace Beery as the father.

Anna Comnena (1083–1148). Earliest female historian. Born at Constantinople, Dec. 1, 1083, daughter of the emperor Alexius I Comnenus, she was wife of the Byzantine historian, Nicephorus Bryennius. Before her father's death she vainly endeavoured to get the succession altered in favour of Bryennius. In 1118, when her brother John succeeded, she intrigued to depose him. The conspiracy was detected, her property was confiscated, and Anna fled to a convent, devoting the rest of her life to writing the *Alexiad*. This prolix work, in fifteen books, undertaken as a continuation of the work of Bryennius, is more of a panegyric of her father than a serious contribution to history. The first two books contain a sketch of the period from 1069 to the opening of her father's reign.

Anna Comnena is one of the chief representatives of the Byzantine purists, whose object it was to reintroduce the style of the ancient classical authors, such as Xenophon and Thucydides. Her sympathies were strongly with the Eastern church and, like her father, she regarded with suspicion the ad-

vance of the Crusaders. Sir Walter Scott made use of the *Alexiad* in his romance *Count Robert of Paris*.

Anna Karénina. A Russian novel by Leo Tolstoy. It was published in 1873–6, and is a powerful story of the tragedy of the conflict between passion and duty; of marriage without love (Anna and Karénin) and love without marriage (Anna and Vronsky). The development of the tragedy of the brilliant, passionate Anna is the central theme of the story. In Levine we have largely an autobiographical study of the author himself. The work has many English translations (R. S. Townsend, 1912; C. Garnett, 1912; Louise and Aylmer Maude, 1918), and several dramatic versions have appeared, including that produced by Lydia Yavorska at the Ambassadors Theatre, London, 1913, in which she played the title-part. Film versions appeared 1935 (with Greta Garbo) and 1948 (with Vivien Leigh).

Annales, LES. Popular French illustrated weekly review of politics and literature. It was founded in Paris in 1883, and under the direction of Adolphe Brisson, the dramatic critic, helped by his wife, daughter of Francisque Sarcy, it numbered some of the best contemporary writers among its contributors. It was published regularly until June, 1940.

Annals (Lat. *annalis*, yearly). Name given to historical and other works in which information is arranged chronologically. From very early times, records of events in Roman history were kept by the priests, especially the pontifex maximus, but their destruction at the sack and burning of Rome, 390 B.C., seriously impairs the credibility of the accounts given of events previous to that date. The earliest prose writer of Roman history proper as distinguished from annals or chronicles was Fabius Pictor (3rd century), who wrote in Greek. From that time historical works became more elaborate and artistic, but the name annals was still used, notably in the *Annales* of Tacitus. With the decadence of Roman literature historical writing degenerated, and the annalistic form revived.

This Roman tradition was carried with the Latin language into the monasteries of medieval Europe and the monkish histories were arranged in annalistic form. The annals of some of the monasteries, Corvey and St. Gall, for instance, are useful as sources for the history of their time. *See* Chronicles.

Annam. Part of the republic of Vietnam (*q.v.*), along the central littoral of Indo-China. Extending for 750 m. along the China Sea, with a mean breadth of 93 m. and an area of 56,973 sq. m., it adjoins Tongking on the N., Laos and Cambodia on the W., and Cochinchina on the S.W.

POPULATION. The earliest inhabitants, long-headed Indonesians, are represented by the primitive Kha, M \ddot{o} i, and Muong, now upland dwellers. The kindred Cham, who, under Hindu and afterwards Muslim culture, maintained during eleven centuries the Champa power, now form a remnant in Binh-thuan and Khanh-hoa valleys. The Giao-chi, immigrant from Tibet, have become by fusion the now dominant Annamese. The population of 6,211,228 is in the main Annamese, the rest being mostly Kha, with Tai, Cham, some Chinese, Minh-huong—offspring of Chinese fathers and Annamese mothers—and a few Europeans. The official Confucianism, besides Chinese Buddhism and Taoism, is subordinated to ancestor-worship, with a substratum of spirit-worship. The primitive peoples are animist.

PHYSICAL FEATURES. A longitudinal backbone extends between the Mekong valley and the sea. The W. boundary of Annam approximates to the mountain crest, except in the S., where a detour takes in the upper waters of two Mekong affluents, the Sebangkhan and Donnat. Averaging 2,150 ft. high, with occasional peaks up to 8,350 ft., this forest-clad ridge is ramparted along its eastern base by foot-hills 15 m. to 30 m. broad, sinking into a cultivable coastal plain 12 m. to 50 m. broad. Two rivers, the Songma and Song-ka, have formed very densely populated rice-deltas. The other streams, short and unnavigable, send down in winter silt-laden torrents, which have formed dunes and lagoons, especially along the ironbound coast down to Tourane. Indurated limestone beds have been hollowed into extensive caves, either by sea action, as at Tourane, or by river action, as at Bo-kinh, in Kwang-binh. The climate is governed by the winds. The N.E. trades from Oct. to May are attended by a temperature from 59° to 75° F., and a heavy rainfall, mostly from Sept. to Dec. The S.W. monsoon, discharging its moisture in Cambodia and Laos, causes a dry season, with a June-Aug. temperature from 86° to 95°.

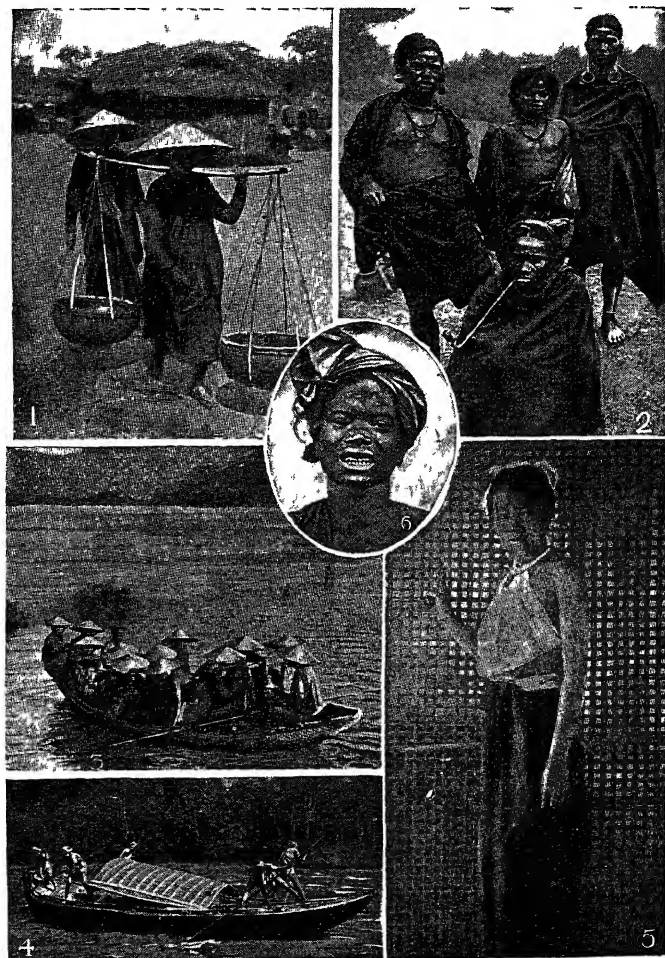
INDUSTRIES. There are three economic regions. The N. region,

based on Hai-fong in Tongking, shares the rice-growing and mining activity of that protectorate. The central region, based on Tourane, is unsuited for rice, which is imported, but produces millet and other cereals. The S. or Cham region, based on Saigon in Cochinchina, depends on agriculture, silk, timber, and coast-fishing. Other products are sugar, cotton, maize, bamboo, ground-nut, oilseeds, tobacco, and spices. In 1944 there were nearly a million head of cattle. Coal is mined near Tourane, magnetic iron-ore in Ngean, and there is some native smelting, and the output of gold and other metals is developing. There are salt works in N., Central, and S. Annam.

The mandarin road from Tongking into Cochinchina passes through the capitals of the coastal

provinces; in Annam this road frequently degenerates into a mere track. But there are 2,093 m. of rly., including a coast line from the Chinese border in the N. to Mytho in the S., through Hanoi, Hué, and Saigon, and a transverse line E. to N.W. from Hai-fong to Yunnanfu in China. Hué (*q.v.*), the capital, has a pop. of 13,056.

HISTORY. After many centuries of Chinese domination a native monarchy, established in 968, gradually overcame the Champa power and attained final independence from China in 1428. French intervention, begun in 1787, led in 1884 to formal suzerainty, and until 1945 Annam remained a native monarchy under French control. The emperor Bao-Dai, who succeeded in 1926, resided at Hué, and was aided



Annam, Vietnam, Indo-China. 1. Native carrying balanced baskets over their shoulders. 2. Native costumes. 3. Women going to market by boat. 4. Poling a river boat. 5. A woman of the interior. 6. Native with filed teeth

by a comat or privy council of seven ministers. The French resident-superior presided over the protectorate council, which was composed of departmental officials and members of the comat. A chamber of representatives of the people was established in 1926.

After the Franco-German armistice of June, 1940, the Vichy government appointed a new governor of Indo-China who, with Vichy approval, agreed to the "temporary occupation" by the Japanese of strategic points in Indo-China in July, 1941, remaining, however, in nominal control until Japan recognized Annam's independence in March, 1945, renaming the country Vietnam three months later. A strong nationalist movement developed, and Annam was a part of the republic of Vietnam recognized by France in March, 1946. The events leading up to this recognition are described under Indo-China. See also Saigon; Vietnam.

Annamese. Indigenous people forming five-sixths of the population of Vietnam, Indo-China. Short, ungainly, tawny, flat-faced, small-nosed, round-headed, they are lowland dwellers, subsisting mainly on rice, fish, and poultry. Both sexes wear silk or cotton trousers and tunics, with the hair coiled into top-knots surmounted by turbans or palm-leaf hats. They blacken the teeth by betel-chewing and varnish, are industrious, independent, and inveterate gamblers. Their dialects and script are of early Chinese derivation.

Annan. A river of Dumfriesshire, Scotland. It rises close to the sources of the Clyde and the Tweed, and flows S. for about 50 m. to the Solway Firth. It has good salmon and trout fishing.

Annan. Royal burgh and seaport of Dumfriesshire, Scotland.



Annan arms

It is pleasantly situated on the Annan, $1\frac{1}{2}$ m. from its mouth in the Solway Firth, and 17 m. E.S.E. of Dumfries by railway. It is an old burgh with historic associations. Industries include the manufacture of rolled breakfast oats and of boilers. The town owns salmon fishings in the Solway Firth. There is a small harbour regularly used by the Solway fishing fleet and small coastal vessels. Edward Irving was a native and Carlyle a schoolboy here. Annan

was frequently involved in the Scottish wars and Border disturbances. During the First Great War the town housed many of the workers at the great Gretna arsenal, and during the Second Great War many workers at ordnance factories in the neighbourhood. The sale of liquor in Annan is under government control, an experiment introduced during the earlier war. Pop. 4,323.

Annapdale. Central division of Dumfriesshire, Scotland. Consisting of the valley of the Annan, 30 m. long and about 16 m. broad, it anciently formed part of Strathclyde and later of Valentia. Near the source of the river is a hollow known as the Devil's Beef-tub or Beef-stand, with steep wooded sides, which figures in Scott's Redgauntlet.

Annapolis. City and capital of Maryland, U.S.A. It stands on the S. bank of Severn river, 2 m. from Chesapeake Bay, and 26 m. S. by E. of Baltimore by the Maryland Electric Rly. It contains the U.S. Naval Academy, St. John's College, and other state, civic, and educational institutions, and has a wireless station. Founded in 1649 as Providence, it received the name Annapolis in honour of Queen Anne. Its chief industry is oyster canning. Pop. 13,069.

Annapolis Royal. Town in the county of Annapolis, Nova Scotia, at the mouth of the Annapolis river, on the Bay of Fundy, at the head of deep water navigation and on the C.P. rly., 120 m. W. of Halifax and 60 m. S.E. of St. John. Chief industries: milling, lumbering, fruit houses, apple orchards, fishing, and shipbuilding. The town contains five churches, public schools academy, library, court house, town hall, theatre, general hospital, nursing home, and three hotels. It is surrounded by a district famous for its apples; a million barrels are produced annually. The town was founded in 1604, was originally the capital of the prov., and is the oldest European settlement in America N. of Florida. Fort Anne, the oldest fortification in N. America, is situated at Annapolis, and, with its historic museum, attracts thousands of tourists every summer. Captured in 1710, it became formally



Annan, Dumfriesshire, Scotland. View of the High Street, looking to the west

British in 1713. It is also known popularly as "the Evangeline country," after Longfellow's poem.

Annas. Biblical character. In the Gospels of Luke and John he is referred to as holding the office of high priest, apparently jointly with his son-in-law Caiaphas; and into his hands Jesus was delivered upon His arrest.

Annates (Lat. *annus*, a year). Ecclesiastical term for the first year's revenue of any clerical benefice. In England this was paid to the pope until 1534, when it was claimed by the king. It was transferred to the Church of England by Queen Anne in 1703. By the First Fruits and Tenths Measure, 1926, annates were, with a very few exceptions, abolished. See Queen Anne's Bounty.

Anatto or **ARNOTTO.** Yellowish-red colouring matter derived from the fruit capsules of *Bixa orellana*, a S. American plant. Produced in Brazil and Cayenne, annatto contains a colouring matter known as bixin. As a dye for fabrics annatto is boiled with potashes. It is much employed as a colouring for cheese and butter, and because of the solubility of the colouring matter in oil it is largely used to impart a rich colour to the oil in which fish is fried.

Anne. Feminine Christian name. A variant of the ancient Hebrew name Hannah, meaning grace, it was used in France and England for both males and females. Anna was another form; in the 7th century there was a king of the East Angles named Anna. After a time, except to a slight extent in France, its use was confined to females, and the form Annie became popular in England and Scotland. Other variants are Ann and the diminutive Annette.

Anne. Saint and mother of the Virgin Mary. According to tradition, she was a native of Nazareth and the wife of S. Joachim. She is regarded as the patron saint of



S. Anne with the Holy Family and S. John, from a famous painting by Raphael
Valla Borghese, Rome

married women. Though held in high honour in the Middle Ages, her festival (July 25) was not generally observed in the Church until 1584. It is retained in the calendar of the Church of England.

Anne (1665-1714). Queen of Great Britain and Ireland. The younger daughter of James II by his first wife, Anne Hyde, daughter of the earl of Clarendon, she was born in London, Feb. 6, 1665. Her childhood passed quietly, its most important incident being the beginning of the friendship between the princess and Sarah Jennings, afterwards duchess of Marlborough, who for long were Mrs. Morley and Mrs. Freeman to each other.

In July, 1683, Anne was married to Prince George of Denmark (1653-1708), and after five years of quiet domestic life came the upheaval of 1688. When William of Orange landed in England she deserted her father and went over to the side of her Dutch brother-in-law, this step being due partly to her friend, then Mrs. Churchill, and partly, no doubt, to zeal for the

Protestant faith. Moreover, the establishment of the Protestant succession to the throne, whereby Anne's half-brother, known later as the Old Pretender, was excluded, made possible, if not probable, her own succession; by the Declaration of Right she was recognized as the next ruler in case William and Mary left no children. During the early part of William's reign Anne was in disgrace, a fact largely due to her friendship for the Churchills, but she obstinately refused to dismiss her favourite lady. Soon after Mary's death in 1694, however, she was reconciled with William and resumed her place in court circles.

In March, 1702, William III died, and Anne became queen, almost her first act being to provide lavishly for her husband, Prince George, and her friends the Marlboroughs. In the war of the Spanish Succession the arms of Britain under the leadership of Marlborough won brilliant victories, the fruits of which were gathered when the treaty of

Utrecht was signed in 1713. In 1707, while the war was in progress, England and Scotland were united, and in domestic politics the present system of party government, directed by a cabinet, the members of which all profess the same political creed, was inaugurated. The literary splendours of the reign earned for it the title of the Augustan Age of English literature, and it is adorned with the names of Addison, Pope, Swift, and Defoe.

Although a woman of few attainments and no talents, afflicted by constant illness and harassed by domestic troubles, Anne made a good queen. Only in ecclesiastical matters did she show any strong opinions, and her devotion to the Church of England was proved by her support of Dr. Sacheverell and the restoration to its funds of the first fruits of every benefice, still known as Queen Anne's Bounty. Her preference for the Tories, largely due to this cause, was shown by her rejoicing openly when a Tory ministry was formed in 1710.

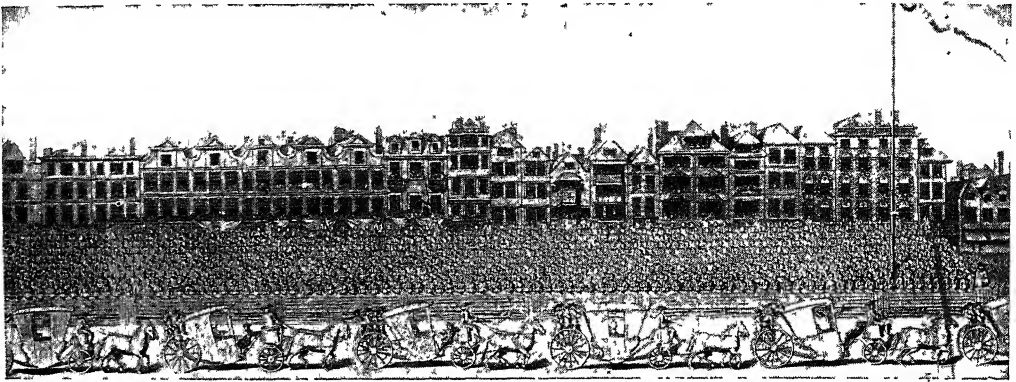
In 1707 came one of the great events of her life, her estrangement from the duchess of Marlborough. The chief cause of the quarrel was undoubtedly the influence which Mrs. Masham, a relative of the duchess and a servant of old standing, was acquiring with Anne; henceforth she and not Mrs. Freeman was the favourite and counsellor of royalty.

In spite of her personal leaning towards the restoration of the



ANNE

Anne, Queen of Great Britain, from a painting by Sir Godfrey Kneller



Anne, Queen of Great Britain and Ireland. "The view of the charity-children in the Strand, upon the VII of July, MDCCXIII, being the day appointed by her late Majesty Queen Anne for a public thanksgiving for the peace (of Utrecht), when both Houses of Parliament made a solemn procession to the cathedral of S. Paul."

From a print of 1715

Stuarts, Anne had recognized, tacitly at all events, the succession of the elector of Hanover, when she died at Kensington, Aug 1, 1714. She was buried in Henry VII's Chapel in Westminster Abbey. She had borne seventeen children, but only one, William, duke of Gloucester, survived infancy, and he died when only ten years old. Anne's private life was exemplary, and in her narrow way she showed a sincere desire to do her duty to the country. *Consult* Life, M. R. Hopkinson, 1934.

Anne of BOHEMIA (1366-94). Queen of Richard II of England. The eldest daughter of the emperor Charles IV, she was born at Prague, May 11, 1366, and in 1382 married Richard II. In 1392 she mediated between the king and the citizens of London, who had refused Richard a loan of £1,000. She died of plague at Sheen, June 7, 1394, and was buried in Westminster Abbey.

Anne (1456-85). Queen consort of Richard III of England. She was a daughter of Richard Nevill, earl of Warwick, and was born at Warwick Castle, June 11, 1456. In 1470 she was betrothed to Edward, prince of Wales, son of Henry VI, and after his death at the battle of Tewkesbury was married in 1474 to

Richard, duke of Gloucester, who became king in 1483. She died March 16, 1485.

Anne of CLEVES (1515-57). The fourth queen of Henry VIII of England. Born Sept. 22, 1515, daughter of John, duke of Cleves, she was married to Henry, Jan. 6, 1540. Neither attracted by her person, nor willing to seem in alliance with the Protestants of Germany, Henry obtained an annulment of the union from Parliament on July 9 of the same year. Anne was pensioned on the understanding that she should not leave the kingdom. Surviving Henry and Edward VI, she died at Chelsea, July 16, 1557, and was buried in Westminster Abbey.

Anne of DENMARK (1574-1619). Queen of James I of Great Britain. She was born in Jutland, Dec. 12, 1574, the daughter of Frederick, king of Denmark and Norway. In 1589 James, then king of Scotland, sailed to Norway, and the marriage with Anne, already contracted by proxy, was celebrated at Opslo, now known as Oslo. They resided in Scotland until the death of Elizabeth, and in 1603 Anne was crowned with James as queen consort at Windsor. She was very extravagant, and exercised little influence in state affairs.

The Catholics in Scotland and England were encouraged by her coquetting with Rome, but their hopes were disappointed. Of her five children only two survived, Elizabeth, queen of Bohemia, and Charles I. She died March 2, 1619.

Anne of AUSTRIA (1601-66). Queen of Louis XIII of France. The daughter of Philip III of Spain, she married Louis in 1615. The union was unhappy, largely owing to Cardinal Richelieu's hostility to Austria; and Louis' repugnance to his wife had not been lessened by the folly of George Villiers, the 1st duke of Buckingham, who openly made love to Anne at Amiens. When Louis died in 1643, Anne became regent, and made Cardinal Mazarin her minister. She became greatly attached to Mazarin, whom she is believed by some to have married, and after his death lived in retirement at the convent of Val de Grace. Of her two sons, Louis became king as Louis XIV. She died Jan. 20, 1666.

Bibliography Mems. on Anne of Austria and her Court, Mme. de Motteville, Eng. trans. K. P. Wormeley, 1902; *Married Life of Anne of Austria*, M. W. Freer, rev. ed., 1912; *Anne of Austria*, M. Buchanan, 1937.



1. Anne, queen of Richard III of England. 2. Anne of Cleves, fourth queen of Henry VIII of England (Holbein, Louvre). 3. Anne, queen of James I of Great Britain (Van Somer, Nat. Port. Gallery). 4. Anne, queen of Louis XIII of France

Anne Ivanovna (1693–1740). Empress of Russia. The younger daughter of Ivan V, she was married to the duke of Courland in 1710.



Anne Ivanovna,
Empress of Russia

Widowed in 1711, she governed the duchy until 1730, when, on the death of Peter II, she accepted the Russian throne. Once recognized as autocrat in March, 1730, she abolished the council and kept the government in the hands of foreigners, chief among whom was her favourite Biren. On her deathbed she appointed Biren regent for her great-nephew, later known as Ivan VI.

Anne Leopoldovna or Carolovna (1718–46). Regent of Russia. The daughter of Charles Leopold, duke of Mecklenburg-Schwerin, she was also niece of the empress Anne Ivanovna, who early adopted her. In 1739 she married Anton Ulrich, duke of Brunswick-Wolfenbützel. Her son, born in 1740, was adopted by the Empress, on whose death in 1740 he became tsar as Ivan VI. Biren, the actual ruler of Russia, was then displaced by a conspiracy and Anne was proclaimed regent in his place, taking the title of grand-duchess. In Dec., 1741, she was deprived of the regency by a bloodless revolution, which deposed Ivan and made Elizabeth, daughter of Peter the Great, empress. She died in exile.

Anne (1477–1514). Duchess of Brittany. Daughter of Francis II, duke of Brittany (then almost an independent state), she succeeded him on his death in 1488. Unable to secure her hand by peaceful means, Charles VIII of France sent an army into Brittany, whereupon Anne was married by proxy to Maximilian of Austria, but the marriage was never consummated. She later married Charles VIII, and, after his death in 1498, his successor Louis XII.



Anne, duchess of
Brittany

Annealing (A.S. *anelan*, to burn). Process applied to various materials, chiefly metals and ceramics, including glass, in order either to remove internal stresses

set up during the processes of manufacture, to remove or reduce the hardening effect of plastic working such as rolling or drawing, or to remove, in some cases locally, the effect of previous heat-treatment such as tempering (in the case of steel) or age-hardening (in the case of light alloys). It involves heating the material to a sufficiently high temperature to cause internal recrystallisation or reorientation of the crystal boundaries, and is usually followed by slow cooling. With most pure metals, particularly copper and aluminum, slow cooling is not essential, but with glass it is absolutely essential; and very large articles such as searchlight mirrors and telescope lenses require weeks or even months to cool at a carefully controlled rate.

Annealing finds its widest application in the metal industry. Most structural metal products are annealed at some stage in their manufacture. Structural castings, particularly those required to maintain dimensional stability, are usually annealed after final machining to remove internal stresses set up by uneven cooling from the molten state, even when they are subsequently subjected to some other form of heat treatment to improve the mechanical properties. Wrought metals, e.g. sheet, tube, wire, sections and forgings, must in general be annealed at one or more stages in their production from the cast ingot, in order to remove the hardening effect of the rolling, drawing, or forging, and to render them capable of further working without cracking or splitting.

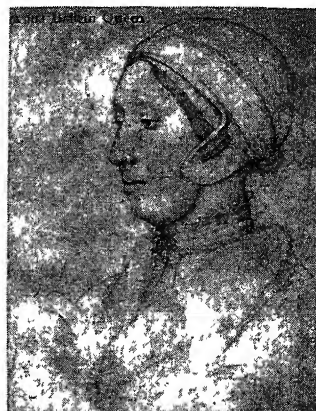
Where additional forming operations are to be carried out on the wrought material, such as the pressing or deep-drawing of sheet into utensils, or the bending or pressing of strip or sections into structural elements, annealed or partly annealed starting material is employed.

In general, particularly in the case of relatively pure metals, fully annealed material has the minimum hardness, as measured by the indentation or scratch tests, the minimum strength as measured by the tensile break test, and the maximum ductility as measured by the extension on break. Some alloys, including most of the heat-treated light alloys, are in the fully annealed condition immediately after the initial heating and quenching and can be subjected to forming operations while in this condition

before the final age-hardening or precipitation process. To anneal metals in part, by heating to moderate temperatures, is not usually feasible, as the results are rather uncertain. Where partly annealed sheet is required, e.g. for deep drawing in dies, it is usual to anneal fully and then subject the material to a moderate amount of further work. Such material is known as quarter-hard or half-hard, as the case may be.

Freeman Horn

Anne Boleyn (1507–36). Queen of Henry VIII. Younger daughter of Sir Thomas Boleyn, created earl of Wiltshire, Anne was taken to court in early life. There the



Anne Boleyn. This drawing by Holbein portrays the queen who went to her death at the age of twenty-nine as a woman of serenity and dignity
Windsor Castle

king became enamoured of her, but found she was not to be won except by marriage. For this and other reasons he resolved to rid himself of Catherine of Aragon, and throughout the proceedings for her divorce treated Anne quite openly as his future queen. In Nov., 1532, or Jan., 1533, when he had finally decided what course to adopt with regard to Catherine, he was privately married to Anne; as soon as Cranmer had pronounced his former marriage null the ceremony was performed publicly. In Sept., 1533, Anne's daughter Elizabeth, later Queen Elizabeth, was born.

Henry, however, soon tired of his new queen. Her conduct was by no means discreet; she failed to give him the son he desired, and Jane Seymour had attracted his attention. A case against the marriage was brought in the ecclesiastical court, and Cranmer pronounced it void. At the same time Anne was tried for treason

before a special court, her alleged offence being not merely adultery but incest. Her condemnation was a foregone conclusion, although it is doubtful whether there was any truth in these charges and she was beheaded on Tower Green, May 19 1536. See Henry VIII., *consult* also History of England, J. A. Froude 1836-70 Lives, P. Friedmann 1884 and P. Sergeant, 1934

Annecy. Town of France. The capital of the department of Haute Savoie, it is an important railway junction at the NW end of Lake Annecy, 24 m by rly NE of Aix les Bains. It has a castle, cathedral, episcopal palace, and library and manufactures linen paper, and hats. It became French in 1860, before which time it was part of Savoy. A centre of the French resistance movement during the Second Great War, Annecy was liberated by the Maquis Aug. 20, 1944. Pop. 15,620. Nearly 1,460 ft above sea level, Lake Annecy is 9 m long and 2 m broad. The river carries its waters to the Rhône.

Annelida (Lat. *annellus*, little ring). Fossil forms, mostly marine worm-like organisms. They have a tubular covering of calcium carbonate, chitin, or cemented sand grains. *Serpula* and *Spirorbis* are the most common genera. The former makes its appearance in rocks of the Silurian formation and is living at the present day, but the coiled form, *Spirorbis*, although appearing somewhat earlier, reached its maximum in Carboniferous times, when it helped in forming thin beds of limestone. See Fossils.

Annelids. Term applied by Cuvier to a group of segmented worms. Earth worms, lob worms



Annelids. The lug-worm or lob-worm found in the sand of the seashore.

and leeches are included and all have the body divided into a series of rings or segments.

Anne of Geierstein; OR THE MAIDEN OF THE MIST. Romance of the closing days of Charles the Bold, by Sir Walter Scott. Published in May, 1829, it deals with the continental adventures of two Lancastrian exiles, the earl of Oxford and his son Sir Arthur

de Vere, the wars of the duke of Burgundy with the Swiss, and the dynastic intrigues of Margaret of Anjou at the court of her father Rene, and introduces the secret society of the Holy Vehm. The heroine, Anne, who marries Sir Arthur de Vere, is a daughter of Count Albert of Geierstein, who joins the army of Lorraine, his dead body being found near that of his enemy, Charles the Bold on the field of Nancy.

Annexation (Latin *ad* to, *nectere*, to bind). In international law the assumption by a state of

third verse and also composed the music.

Anning, MARY (1799-1847). English naturalist. Born at Lyme Regis May, 1799, she was the daughter of a cabinet maker whose hobby was the collecting of fossils from the neighbouring cliffs. As a child she accompanied her father on his expeditions and after his death continued the pursuit making a small income by selling her specimens. In 1811 she discovered the first complete ichthyosaurus. With the aid of local workmen the 30 ft



Annecy, France. Showing the castle, the canal and Pont de Thiou and the quays from which passengers embark on the lake steamers.

sovereignty over territory not previously within its dominions. In olden days this was called conquest. The term annexation carries with it the meaning that the acquiring state takes over the territory acquired without regard to the wishes of the people of that territory. Modern instances are the annexation by Germany of Austria in 1938 and of Czechoslovakia in 1939 and the annexation of Albania by Italy in 1939. See International Law.

Annie Laurie. Eighteenth century Scottish song by William Douglas. Annie Laurie was a real person, who lived from 1682 to 1764. The daughter of Sir Robert Laurie, 1st bart., of Maxwellton House, Dumfriesshire, she married Alexander Ferguson of Craigdarroch in 1717. William Douglas, of England, Kirkcudbright, was her rejected suitor, who afterwards made a runaway match with Betty Clark, of Glenboig, Galloway. The words of his song were first printed by C. K. Sharpe, in 1824, they were remodelled in 1835 by Lady John Scott (1810-1900), who added a

skeleton was dug out of the block in which it was embedded. For years it was thought to be that of a crocodile, but its true identity was in due course established and it was removed to the South Kensington museum. Later she discovered a skeleton of the plesiosaurus, and in 1828 the remains of a pterodactyl. She received a small government grant, but was little honoured in her native town, where she died March 19, 1847.

Anniston. City of Alabama, U.S.A., the co. seat of Calhoun county. A health resort on the slope of the Blue Mts., it is 63 m. ENE of Birmingham by the Southern rly. Founded in 1873 by an iron company, it has now a number of manufactures, mainly connected with the coal and iron found around it, and is a centre of the cotton trade. Pop. 25,523.

Anniviers, VAL D' (Ger. Livschthal). Mt. glen of Switzerland, in the Rhône valley. It runs N and S in canton Valais from Sierre to the Dent Blanche, and contains the villages and resorts of S. Luc, Aver, Chandolin, and Zinal.

ANNO OR HANNO (d 1075) A German saint and ecclesiastic. He was made archbishop of Cologne in 1036. In 1062 he was entrusted with the education of the young emperor Henry IV and was made regent of the empire. He reformed all the monasteries in his diocese. He died at Cologne, Dec 4, 1075, and was canonised shortly afterwards.

Annobon. Small island in the Gulf of Guinea, belonging to Spain. It is 110 m S W of St Thomas, is 4 m long by 2 m broad, and has an area of under 7 sq m. The chief town is San Antonio de Praia, and the roadstead is visited by ships for water and provisions. Annobon was discovered by the Portuguese on New Year's Day 1471. Pop 1,400, mainly negroes.

Anno Domini. In the year of our Lord, a Latin phrase abbreviated A D. It is used for the chronology of the Christian era, the previous time being described as B C — i.e. before Christ. See Calendar.

Annonay. Town of France, in the department of Ardeche. It is 50 m S of Lyons on the riv to Bordaunx, at the junction of two small rivers, the Cance and the Dôme. It has manufactures of gloves and paper. Pop 16,661.

Annual Register. A British yearly review of public events at home and abroad, begun by Robert Dodsley in 1758. For many years Edmund Burke was the principal contributor. A rival publication was begun by Rivingtons in 1791, and the two were combined in 1824. Since 1890 the work has been published by Longmans. Dr Kippis was first editor of *The New Annual Register*, which ran from 1780 to 1825 inclusive; Sir Walter Scott edited *The Edinburgh Annual Register*, 1808–27, and Arthur Aikin *The Annual Review*, 1802–8.

Annals. Books of verse, tales, essays, and engravings, mainly intended for gifts at Christmas, the New Year, and on birthdays. They were very popular in the third and fourth decades of the 19th century, the fashion being set by Rudolph Ackermann's *Forget Me-Not*, 1823–47, and followed by *Friendship's Offering*, *Literary Souvenir*, *Amulet*, *Keepsake* etc. The term is often applied to annual reference books.

Annals. Varieties of plants which, raised from seed, blossom and die within a year. For large gardens of permanent establishment annuals are not greatly in demand, but in small town and suburban gardens, where the tenants are often migratory, they are most useful, as they offer what may be termed a quick result garden.

There are two divisions of annuals, hardy and half hardy, the genera and species of which embrace many thousands. Hardy annuals, if sown in the open ground in the spring flower in the summer, and die in the autumn of the same year. Half hardy annuals require to be started in heat, that is, sown in boxes in a heated greenhouse, hotbed or frame, and transplanted in the open air when all danger of late frosts is over. Half hardy annuals may also be sown in the open ground late in May or early in June, but the results are rarely so satisfactory, and the period of blooming is retarded.

Annuals should be well soaked when watering. They are not deep rooting subjects, and a mere surface damping sends the roots upward in search of moisture, with the result that the following day's sun plays havoc with them. To obtain the fullest results with annual flowers a succession of seed should be sown at intervals of a fortnight or three weeks. Popular garden annuals include China aster, candytuft, clarkia, godetia, larkspur, love in a mist, margold, nasturtium, sweet sultan, sweet pea, tobacco plant, and Virginian stock. Consult *Annals R. Hay*, 1937.



Annunciation From D. G. Rossetti's painting, *Ecce Ancilla Domini!* See p 472
National Gallery, London



Annunciation. From the painting by the great Spanish artist Murillo
Wallace Collection, London

Annuity (Latin *annus*, year). Periodical payment made for a limited time and carrying with it the repayment of capital by regular instalments. The time during which an annuity is payable may be either a fixed term of years, or the duration of one or more lives. The word is sometimes used for a pension, as when the king grants an annuity to a retiring judge, or Parliament votes one to a member of the royal family. Deferred annuities are annuities purchased, often by instalments, but not payable until the purchaser or his nominee has reached a certain age. Annuities are in most cases purchased from either the Government (through the National Debt Office, the Post Office Savings Bank, and Trustee Savings Banks), or from insurance companies. The cost of annuities is calculated by skilled actuaries. Every £100

will purchase a certain annual income, varying according to the age and sex of the intending annuitant. Annuities on the lives of women cost more than those on the lives of men because the calculations of the actuaries show that women tend to have a better chance of longevity than men. The purchasers of annuities are usually persons who, having no particular desire to conserve their capital, wish to obtain a higher rate of interest for their money during their lifetime. Annuities are also bought by executors and trustees to carry out bequests of testators.

Since 1808 the British Government has sold terminable annuities, chiefly as a means to repay part of the National Debt. The purchaser of one of these hands over to the Treasury a certain sum of money. With it Consols or some other public security is bought and

cancelled, while to the annuitant the Government pays a certain sum every year until death, when the liability is ended.

The idea of annuities is an old one, but the cost was first worked out on a scientific basis in Holland in the 17th century. By a converse process an annuity can be commuted or sold for a lump sum of money. Rates for transactions of this kind are also worked out in minute detail by actuaries. For instance, a man of 54 wishing to obtain money for his annuity of £100 would receive something like £1,100, because, according to actuarial calculation, it is worth eleven years' purchase.

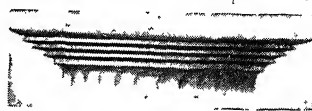
The following statement shows the approximate yield per cent on capital sunk in the purchase of annuities through the Post Office Savings Bank on single lives at a few selected ages:

Age last birthday at time of purchase	When the average price of Consols is £80 or between £80 and £83.		Males		Females	
	Per cent		Per cent		Per cent	
5	£	s. d.	£	s. d.	£	s. d.
15	3	10 11	3	8 9	3	8 9
25	3	15 10	3	12 10	3	12 10
30	4	2 5	3	18 9	3	18 9
35	4	6 11	4	2 6	4	2 6
40	4	12 3	4	6 11	4	6 11
45	4	19 2	4	12 4	4	12 4
50	5	8 2	4	19 2	5	8 1
55	6	0 4	5	8 1	6	0 3
60	6	17 0	6	0 3	6	17 2
65	8	0 3	8	0 11	8	0 11
70	9	11 1	9	15 10	9	15 10

Age last birthday at time of purchase.	When the average price of Consols is £83 or between £83 and £87.		Males		Females	
	Per cent		Per cent		Per cent	
5	£	s. d.	£	s. d.	£	s. d.
15	3	9 0	3	6 9	3	6 9
25	3	13 11	3	11 0	3	11 0
30	4	0 8	3	17 0	3	17 0
35	4	5 0	4	0 9	4	0 9
40	4	10 6	4	5 3	4	5 3
45	4	17 6	4	10 8	4	10 8
50	5	6 6	4	17 6	4	17 6
55	5	18 8	5	6 6	5	6 6
60	6	15 4	5	18 8	5	18 8
65	7	18 6	6	15 8	6	15 8
70	9	9 5	7	19 5	7	19 5
	11	11 8	9	14 4	9	14 4

See Insurance.

Annulet (Lat. *annulus*, a ring). Architectural term for the fillets at the base of the Doric capital. In



Annulet in architecture, the fillets of a Doric capital

heraldry, as a mark of cadency, the word denotes the fifth son and his descendants.

Annunciation (Lat. *annunciare*, to announce). Literally, the act of making known or announcing anything officially or publicly. The

Feast of the Annunciation was appointed by the Church to commemorate the day on which the angel Gabriel announced to the Virgin Mary that she should bring forth a son and should call His name Jesus (Luke 1). The day, the observance of which dates from the 7th century, has always been observed in the Western Church on March 25, except in Milan, and for a time in Spain, when the Council of Toledo (656) changed the date to Dec. 18 so that it should not occur in Lent. The original date was restored in Spain when Dec. 18 became the Feast of the Expectation of the Blessed Virgin. In the Church of England calendar the title is the Annunciation of the Virgin Mary; in the table of Lessons proper for holy days, Annunciation of Our Lady—hence Lady Day. The subject of the Annunciation has inspired some famous paintings. The name is given to several orders. See Incarnation; Lady Day.

Annunziata, ORDER OF THE. An Italian order dating from 1362. It was founded by Amadeus VI, count of Savoy, as the Order of the Collar and his successor, Amadeus VII adopted the motto *Fert* (literally he brings), possibly an allusion to the relief of Rhodes by Amadeus V—*Fortitudo ejus Rhodum tenuit*, his bravery kept Rhodes—although no certain explanation can be given. It was remodelled in 1518, was taken over by Sardinia, which was ruled by the counts of Savoy, in 1869, and became Italian when the kings of Sardinia became kings of Italy. The badge is a representation of the Annunciation, surrounded by knots: the ribbon is blue.

Annunzio, GABRIELE D' (1863-1938). Italian author and imperialist. He was born at Pescara. March 12, 1863, of Dalmatian extraction, and studied at Rome university. A lyric poet from boyhood, he achieved fame with *Canto Nuovo*, 1882, and followed it with a succession of poems, short stories, and novels. The brilliance and beauty of his descriptive passages led some to hail him as the greatest of modern Italian writers, while many attacked him as a perverter of public morals. *Il Trionfo della Morte* (The Triumph of Death), 1894; *Le Vergini delle*

Rocce (The Virgins of the Rocks), 1896; and *La Città Morta* (The Dead City), 1898, were translated into English. A scandal broke out over *Il Fuoco* in 1900, as a result of the cruel treatment therein of the actress Eleonora Duse (*q.v.*), with whom he had had a love affair: and all his books were placed on the papal index. With *Laudi del Cielo, del Mare, della Terra e degli Eroi*, he was nevertheless hailed as a great national poet; and in 1928 his works were published under royal patronage.

In the first Great War d'Annunzio served in the Italian cavalry, infantry, navy, and finally with great gallantry as an airman, losing an eye. Appearing after the armistice as an imperialist and crusader, a mixture of Garibaldi and Byron, he declared that the peace conference was betraying Italy. In Sept., 1919, he led a raid on Fiume, which was being awarded to Yugoslavia; he occupied it and ruled for over a year as a Renaissance despot until forcibly ejected by the Italian government. Reconciled to Mussolini in 1923, he was next year created prince of Montenevoso. His later years were devoted to autobiography, aviation, and motoring. He married in 1883 the Duchessa Maria Gallese, but was notorious for amours. He died March 1, 1938.

Bibliography. Gabriele d'Annunzio, the Warrior Bard, G. Griffin, 1935; D'Annunzio, A Portrait, F. Nardelli and A. Livingston 1931.

Ann Veronica. Novel by H. G. Wells. Published 1909, it was one of the earliest in the author's series of sociological novels and the first of them to deal at length with the relationship of the sexes. The spirited frankness (in relation to the conventions of the time) with which the adventures of the heroine, Ann Veronica Stanley, were treated caused offence in some quarters, and the work was banned from several public libraries. The book, though not one of the author's best, long survived such treatment.

Ann Vickers. Novel by Sinclair Lewis. In contradistinction to the author's earlier masterpieces, *Main Street* and *Babbitt* (*q.v.*), where the emphasis is masculine, Ann Vickers, published in 1933, stresses the feminine point of view. The heroine is a social worker, dedicating herself to settlement work and prison reform. The book achieved a popular success in America and Great Britain.

Anointing. Ceremonial use of consecrated oil or ointment. The practice is often referred to in the Bible, *e.g.* Gen. 28 and 35. Ex. 29 and 30; 1 Sam. 10 and 15; 2 Kings 9; Matt. 6; Luke 4; James 5. The custom prevailed in the early Christian church of anointing at baptism, confirmation (chrisma), in time of sickness, and at ordination, and is still so retained in the Roman Catholic church. In the Anglican church anointing at ordination ceased in 1549; at baptism and the visitation of the sick in 1552; and at confirmation in 1662; and is retained only at a coronation of the sovereign. See Extreme Unction.

Anolis. Genus of lizards, also known as American chameleons. They are common in the W. Indies and neighbouring mainland, their native name in the Antilles being anoli. They are small, slender, and active, have large dewlaps and very brittle tails, and some can change colour. See Lizard.

Anomalistic Year (Gr. *an-*, not; *homalos*, even). The time of the earth's yearly movement round the sun reckoned from perihelion to perihelion. The earth moves with a different speed in its orbit at different times of the year, moving most swiftly at perihelion when nearest to the sun, and most slowly at aphelion when farthest away from it. The anomalistic year is, owing to the precession of the equinoxes, longer than the true or tropical year by about 25 min. The anomalistic month is, in an analogous way, referred to the return of the moon to perigee, that is, to her nearest approach to the earth.

Anomaly. Term used in English law. Where some suggested doctrine stands in contradiction to general legal principles it is anomalous; and this fact furnishes a powerful argument to show that it is not good law. Nevertheless, there are many legal anomalies. The word is also used where there are exceptional cases in which the general rules of law do not operate satisfactorily. Thus the ministry of Labour was given power to make orders for the purpose of removing anomalies arising in the operation of the Unemployment Insurance Acts, *e.g.* where persons were employed for part only of the year on seasonal work.

Anorthite. A silicate of calcium and aluminium, and an important member of the group of plagioclase feldspars. Like all the soda-lime feldspars, it crystallises in forms belonging to the triclinic



Gabriele d'Annunzio

system. It is a prime constituent of basalt and other igneous rocks. It also occurs as a product of thermal metamorphism of calcareous rocks, particularly brilliant small crystals being found in many of the blocks of calcareous rock ejected from the crater of Vesuvius.

Anorthoclase (Gr. *an-*, not, *orthos*, straight, *klasis*, fracture). Felspar similar to orthoclase, but with soda replacing potash in its composition. It may be regarded as an intimate mixture of the two feldspars, orthoclase and albite, as is suggested by its micro-structure. It is a constituent of many alkaline igneous rocks, more especially those allied to the nepheline-syenites.

Ansa (Lat. *ansa*, handle). The name given by early astronomers to Saturn's rings. The planet was supposed to resemble a vase, and the name was applied from the appearance of the appendages in certain positions of Saturn.

Ansaldo, GIOVANNI (b. 1895). Italian journalist and political writer. Born at Genoa, he was first known as leader-writer for the Genoa socialist paper *Il Lavoro*. But after being imprisoned by the fascist government for insulting the army, he became an ardent fascist, and from 1938 acquired notoriety as editor of Count Ciano's paper, *Il Telegrafo*, of Livorno, and was called "Mussolini's mouth-piece." On Italy's capitulation to the Allies, Sept., 1943, he ceased to be a prominent figure.

Ansbach or **ANSBACH**. Town of Bavaria, Germany. It stands on the Rezat, 27 m. by rly. S.W. of Nuremberg, has brewing, iron-founding and other industries, and trades in agricultural produce. As the residence of the margraves of Ansbach, it was a place of some importance; their palace, erected 1713-23 and now used for public offices, stands in a large park. Ansbach has several fine ancient churches and a good museum. The little principality of which it was the capital was long ruled by a branch of the Hohenzollern family, who obtained it in 1362 and called themselves margraves. It was sold to Prussia in 1791 and transferred to Bavaria in 1806. Pop. 21,923.

Ansbach, taken by Gen. Patch's U.S. 7th army, April 19, 1945, lay in the U.S. zone of occupation after the German surrender.

Anschluss (Ger., joining). Word used by German propagandists to describe the plan for union of Austria with Germany. This union was forbidden (save by the consent of the League of Nations)

in 1919 by the Treaty of St. Germain; but, after long agitation, and some support in Austria for the idea of the Anschluss Hitler sent his troops into Austria on March 11, 1938. The next day the Austrian government promulgated a law whereby the federal state of Austria was dissolved and Austria was declared a land of the German Reich, with the same status as Prussia, Bavaria, etc.

Ansell, JOHN (1874-1948). An English musician. Born in London, March 26, 1874, he studied at the Guildhall school of music, and was musical director at various London theatres from 1907 onwards, with an interval from 1926 to 1930 with the B.B.C. He composed comic operas, including *Violette*, 1918, and orchestral pieces of which the overture *Plymouth Hoe* is best known. He died Dec. 14, 1948.

Anselm (1033-1109). English saint, archbishop, and theologian. Born at Aosta, he entered in 1060



S. Anselm's seal
British Museum

the Benedictine abbey at Bec, and in 1078 was made abbot. On the death of Lanfranc, archbishop of Canterbury, in 1089 William Rufus appropriated the revenues of the see until 1093, when he appointed Anselm archbishop.

The king and Anselm were soon in collision. In 1094 William called upon the archbishop for a contribution to his war against Robert of Normandy, but he rejected the amount offered as insufficient. Anselm distributed his money and declined to make another offer. Anselm proposed to go to Pope Urban to obtain the archbishop's pallium. William asserted that neither pope nor antipope was to be recognized without his own authority. Anselm denied that the question was an open one and was supported by the barons. Though the Church denied that ecclesiastical appointments and lands were subject to the secular authority, William continued to extort money from the churchmen and called upon Anselm to furnish men for his Welsh war. When the bishop left England, the king again seized the revenues of Canterbury.

William was succeeded in 1100 by his brother Henry I, who at once sought a reconciliation with the exiled archbishop. Eventually, in 1105 a compromise was reached.

The insignia of ecclesiastical offices were to be bestowed only by spiritual authority; in return the prelates and abbots were to do homage for their temporalities. With the ratification of this settlement Anselm finally returned to England in 1107. He died April 21, 1109, and was canonised in 1494.

Anselm was the great theologian of his day, and is accounted one of the founders of medieval scholasticism by virtue of his endeavour to reconcile faith and reason. The most notable of his theological works is *Cur Deus Homo*, an exposition of the doctrine of the Incarnation.

Angarius or **ANSCHAR** (801-865). A French saint and prelate, often styled the Apostle of the North. A native of Picardy, he became a monk at Corvei. In 826 he was sent to preach the Gospel to the Danes. After two years' work in Denmark he went to Sweden and three years later was appointed archbishop of Hamburg. Returning to Scandinavia in 854, he founded churches in Slesvig and Sweden. Made the first archbishop of Bremen in 847, he built hospitals, ransomed captives, and endeavoured to mitigate the slave trade. He was the author of a *Life of S. Willehad* and a collection of prayers called *Pimenta*.

Anson, GEORGE ANSON, BARON (1697-1762). A British admiral. Born April 23, 1697, at Shugborough, Staffordshire, he entered the navy in 1712, became a captain 1724, and in 1739 on the outbreak of the war with Spain, was given command of a squadron of six ships in the Pacific. The expedition, which set out on Sept. 18, 1740, was ill-equipped and ill-manned, ships were lost off Cape Horn, and Anson's flagship,



Baron Anson of Soberton, British admiral

After Sir Joshua Reynolds

the Centurion, alone survived, returning by the Cape of Good Hope and reaching Portsmouth June 15, 1744, thus circumnavigating the globe. Spanish treasure to the value of £500,000 was a tangible result. Created rear-admiral of the blue in 1744, Anson's next triumph was the defeat of the French fleet off Cape Finisterre, May 3, 1747, in recognition of which he was raised to the peerage. He was first lord of the Admiralty from 1751, with a short interval, until his death at Moor Park, Herts. June 6, 1762.

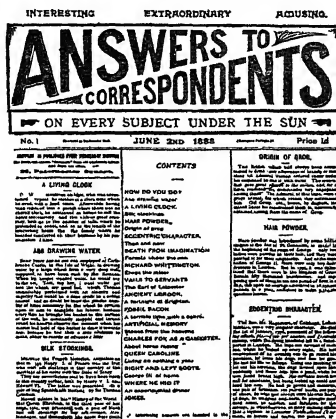
The many successes of the British navy were in great measure due to Anson's home administration. He was also responsible for the organization of the marines in their present form, and his reconstruction of the articles of war lasted until 1865. The well-known Voyage Round the World, edited by Anson's chaplain, Richard Walter, is still a popular work.

Anstey, F. Pen-name of Thomas Anstey Guthrie (1856-1934), British humorist and playwright. Born at Kensington, Aug. 8, 1856, and educated at Trinity Hall, Cambridge, he was called to the bar, but abandoned law for authorship. He made a name with *Vice Versa*, *A Lesson for Fathers*. 1882, following this with other humorous fantasies such as *The Giant's Robe*, 1883. *The Tinted Venus*, 1885: and *The Brass Bottle*, 1900. Much of his best work appeared in *Punch* after he had joined the regular staff of that periodical in 1895. *e.g.* *Voces Populi*, *Baboo Jabberjee*, *B.A.*, and *The Man from Blankley's*. The last-named enjoyed a vogue as a stage farce, as did stage versions of *Vice Versa* and *The Brass Bottle*. Guthrie died March 10, 1934, and an autobiography, *A Long Retrospect*, was published in 1936.

Anstruther. Original and still most widely used name of a harbour and fishing town of Fife, Scotland, the official name being the Royal Burgh of Killyrenny, Anstruther Easter, and Anstruther Wester, these burghs having been united 1929. It stands on the firth of Forth, 9 m. S.S.E. of St. Andrews and 19 m. E. of Thornton Junc. by L.N.E.R. It has a fine harbour, is the centre of the Fife fisheries, and engages in ship-building, fish-curing, and the manufacture of oilskin goods.

Answers. Weekly periodical started in 1888 by Alfred Harmsworth, later Viscount Northcliffe. As Answers to Correspondents it

appeared first on June 2, 1888, and soon attained an immense circulation. Competitions of various kinds, some of them with huge prizes attached, have appeared in its pages, and its contributors have included Thomas Hardy, J. K. Jerome, Sir A. Conan Doyle, John Strange Winter, and Sir Max



Answers. Reduced facsimile of front page of the first number of the popular weekly journal, issued June 2, 1888

Pemberton. It was the first of the papers issued by the firm which became later the largest publishers of the kind in the world—the Amalgamated Press (*q.v.*).

Ant. Group of insects belonging to the order Hymenoptera (membrane-winged), which includes the bees and wasps. They are distinguished by having the first segment of the abdomen reduced in size to a mere stalk to which the rest of the abdomen is attached. The stalk bears a hump or tubercle (sometimes two) on its upper surface which is not found in other Hymenoptera. The queen and males have wings, but the workers, who constitute the bulk of each ant community, are wingless. About 2,000 species are known, and they occur in nearly all parts of the world except the frozen regions.

Ants are regarded as the most intelligent of all insects, and the economy of their communities is even more highly developed than that of the hive bee. It is held by many naturalists that, among all the creatures they have studied, in the ant instinct reaches its highest level. There is, in fact, scarcely any form of mental activity, apart from abstract reasoning, that does not suggest itself in the proceedings of this insect. Indeed, Lord Avebury went so far as to say of the ants generally, that their mental powers differ not so

much in kind as in degree from those of men. Most remarkable in the ant is its power of memory. If an ant is taken from a nest, kept in captivity for several months, and then returned to the nest in company with a stranger, the latter will at once be killed and the former admitted into the home with every sign of recognition and pleasure. A colony of ants that have found a desirable cupboard, however far from their nest, during the summer, will come straight back to it after hibernation, showing that the fact of its existence and the route by which to reach it have both been remembered. Numerous experiments made by Lord Avebury and other investigators clearly establish the fact that ants are able to communicate with and impart information to one another. An ant that finds a scrap of food too large to carry away will hurry back to the nest and return with assistance. If one ant finds a large heap of food and another a small one, the former will bring a much more numerous company of assistants than the latter.

The practice of slave-keeping prevails among certain species. Raids are made on the nests of weaker species and, after battle, the pupae are carried off to the nest of the robbers, and the young ants reared and kept as workers for the community. One species of ant depends entirely upon slave labour for the work of the nest, and does nothing except occasionally carry out a slave raid on its weaker neighbours. The statement that ants keep cows is, in a sense, perfectly true. Ants are fond of feeding upon honeydew, a secretion of the aphides or plant lice, and commonly climb the stems of plants to obtain it. Certain species construct tunnels over the aphides or build walls of earth around them to prevent their escape. They convey the eggs of aphides, to their nests, carefully tend the young, and in all ways show themselves accomplished cow-keepers. Other insects, such as small beetles, are also kept by ants in their nests, and carefully fed. It is improbable that the ants keep them as mere pets, so it is assumed that they serve some purpose which observers have so far failed to establish.

Ants are of three castes, queens, males, and workers, the last being neuters or sterile females. So far as is known, caste is determined by the conditions under which the larvae are reared. At certain seasons the young queens and



Ant. 1. Female wood ant, before shedding her wings in the nuptial flight. 2. Winged male wood ant. 3. Slave raid by large red ants on the nest of a small black species with the object of carrying off the cocoons. 4. Wingless queen. 5. Typical worker, an imperfectly developed female. 6. Nest of wood ants, showing how cocoons are transported in the mandibles of a 'nurse' worker. 7. Black ants taking the body of a queen which has died outside back to the nest.

Photos 1-5, 7, H. Bastin; 6, Rev. S. N. Sedgwick.

the males take a nuptial flight. On their return the queens lose their wings and settle down to egg-laying. There are often several queens in a single nest, and individual queens have been known to live and continue laying eggs for fifteen years.

The eggs are carried about by the workers from one part of the nest to another according to the temperature, and undergo a continual process of licking. They hatch in about sixteen days in warm weather, and the young larvae are fed with half-digested food and cleaned by the workers. In due course they turn into pupae, usually but not always wrapped in white silken cocoons, forming the so-called ants' eggs. After some days they emerge as perfect insects, are carefully cleaned by the nurse ants, and then go about the work of the community. The nest consists of a series of passages and chambers constructed sometimes in the ground, sometimes in masses of fallen leaves and wood debris, or in the trunks of old trees. In the tropics the nests are often of great size and of most elaborate construction. A large community will often construct several nests in close proximity.

Ants will eat almost any kind of animal or vegetable matter of a nutritious character, sweet things being much preferred. The British species do not lay up a store for the winter, though this is done by some in hotter climates. During the winter they remain dormant.

Certain species of ants can sting, but all possess a poison bag charged with formic acid as a protection against enemies. In some species this poison is conveyed by the bite, while in others it can be ejected to a distance of two feet or more. A handkerchief lightly brushed over a colony of common wood ants will be found to be charged with acid.

In the tropics ants are so numerous, so pugnacious, and so destructive that they become a serious pest. The insects of the tropics that are commonly known as "white ants" do not, however, belong to the same order (Hymenoptera) as the true ants, but to a separate order known as Isoptera, comprehensively called termites and termite is the proper designation of an insect of this family.

To a certain extent ants are beneficial as scavengers, and sometimes serve a useful purpose in fertilising flowers. When they find

their way into houses, as they are fond of doing, they often become a source of annoyance and are usually difficult to expel. Powdered borax sprinkled about their haunts will discourage them, and they are said to dislike the odour of powdered cloves. When a cupboard is infested by them, a little turpentine injected into the crevices, or powdered camphor sprinkled about, will often get rid of them. See *Insects*; *Termites*; *consult* *Ants*, W. M. Wheeler, 1910; *The Ant*, E. Step, 1924; *British Ants*, H. Donisthorpe, 1927; *Guests of British Ants*, H. Donisthorpe, 1927. *Ants*, J. Huxley, 1935.

Antacid. Term occasionally used in medicine for a substance which neutralises acidity. The drug most frequently employed for this purpose is sodium bicarbonate, in doses of from 5 to 30 grains. It should be taken about half an hour after a meal, and is appropriate in those cases where pain is felt some hours after a meal and is associated with gaseous eructations. Less harmful antacids include aluminium hydroxide and magnesium trisilicate. Other magnesium preparations are also widely used.

Antaeus. In Greek mythology a Libyan giant, son of Poseidon and Gē (the earth). A mighty wrestler, a fall to the ground only brought him fresh strength from his mother earth. He was conquered by Hercules, who held him up in his arms out of reach of the earth and squeezed him to death.

Antalcidas (4th century B.C.). Spartan diplomatist and naval commander. The blockading of the Athenian fleet by Antalcidas compelled the Athenians to accept the terms known as the Peace of Antalcidas (387).

Antalya. Vilayet of Turkey, formerly known as Adalia (*q.v.*)

Antananarivo OR TANANARIVO (French *Tananarive*). Capital of Madagascar. Situated on a hill

its 14,000 m. of coastline are not completely known, and more than three-quarters of the inland area of 5,000,000 sq. m. have not been traversed by man. Graham Land is the land region farthest (1,750 m.) from the South Pole and also the nearest to one of the other continents, being less than 700 m. from South America. Exactly on the other side of Antarctica the long stretch of explored coast near Wilkes Land lies just beyond the Antarctic Circle, 1,600 odd miles from the Pole; Wilkes Land is about 1,700 m. from Tasmania. East of the Graham Land peninsula is the Weddell Sea, one of the great indentations into the outline of the continent; the other great bay is Ross Sea, fringed by

in King Edward Land, some 150 m. S.E. of the Bay of Whales. Inland of the mts., round the Pole itself, is a plateau where the overlying ice sheet is between 1,000 ft. and 2,000 ft. in thickness, and its surface is some 10,000 ft. above sea level. The extent of this plateau has still to be determined; it is not probable that it connects with King Edward Land. On the inland ice, slight depressions, in which move ice streams or false glaciers, have been discovered, and any explorer who approaches the Pole, as Shackleton intended, from a base on the Weddell Sea might be severely handicapped by the ice streams and mt. ranges which are known to exist between the Pole and the Weddell Sea.

Mt. Erebus on Ross Island, 13,000 ft., is an active volcano. the direction and shape of the clouds above the crater are a guide to the weather conditions in McMurdo Sound. Due S. the mts. which fringe the Beardmore Glacier rise to heights between 13,000 and 15,000 ft., and consist largely of a carboniferous formation in which seven seams of coal were detected in 1908. Most explorers in Antarctica have met blizzards of terrific intensity, and it is one of the tragedies of the South that so many have been detained for days together in camp by these fierce storms, unhappily in the case of Scott with serious loss of life. The continent contains the South Magnetic Pole, lying in Wilkes Land. The large Emperor penguin and the smaller penguins are familiar denizens of Ross Island.

Future work in determining the geography of the continent will depend upon pure scientific research on the one hand and on the other on commercial enterprise in an attempt to exploit the known coal deposits and to discover other deposits of minerals that may prove of commercial advantage. See Antarctic Exploration.



Antananarivo. The capital of Madagascar is a pleasant city with many modern thoroughfares such as the Avenue Fallières seen above

4,750 ft. above sea level, it is in the central plateau of the island, about 100 m. from the E. coast. Here are the administrative offices, Anglican and Roman Catholic cathedrals, numerous churches, the royal palaces, schools (including a school of native medicine), and colleges. It has several industrial establishments, including a meat-preserving factory, and is connected by rly. with Tamatave, the chief seaport. Pop. 126,515, including 7,376 Europeans.

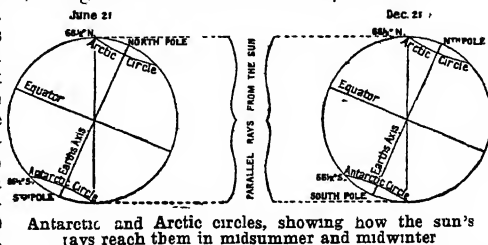
British troops under the command of Gen. Platt entered Antananarivo on Sept. 23, 1942, four months after the occupation of Diego Suarez. The Vichy govt authorities offered only slight resistance, and on the occupation of the capital Gen. Platt declared Madagascar to be temporarily under British military jurisdiction.

Antarctica. The circumpolar continent of the South. This, the sixth of the great land masses of the world, is only slightly explored:

the Ross Ice Barrier, 840 m. from the Pole; at the N.W. corner of Ross Sea are the Balleny Islands, some 1,400 m. from the S. of New Zealand.

The coast consists chiefly of ice which changes in outline with the winds, currents, etc. This false coast forms, *e.g.* in the Ross Ice Barrier, cliffs which reach a height of 150 ft. The permanent land edge may be some miles behind the ice edge; the floating Ross Barrier, for instance, is fed by the glaciers some 400 to 500 m. from the open Ross Sea. Only about 4,000 m. are rock coast. Less than 10 m. from the land edge mts. frequently rise, as in South Victoria Land, to 13,000-15,000 ft., or 2,000-9,000 ft. above

the ice cap: these contain the true glaciers. Elsewhere the land rises less rapidly. Lt. Shirase, *e.g.*, attained a height of only 1,000 ft.



Antarctic and Arctic circles, showing how the sun's rays reach them in midsummer and midwinter

Antarctic Circle. Parallel of latitude drawn $23\frac{1}{2}^{\circ}$ (approximately) from the South Pole, *i.e.* in latitude $66\frac{1}{2}^{\circ}$ S.

ANTARCTIC EXPLORATION: 1773-1937

Admiral Lord Mountevans, K.C.B., D.S.O.

This account of the various Antarctic expeditions is by Captain Scott's successor as leader of the expedition of 1910-12. See also the articles on the various lands and seas of the Antarctic regions and those on Amundsen, Byrd, Scott, Shackleton, and other explorers

Exploration in the Antarctic may be said to date from Jan. 17, 1773, when Captain James Cook was the first man to cross the Antarctic Circle, in long. 38° E.; the farthest S. he then reached was $67^{\circ} 15'$ S. in long. $39^{\circ} 35'$ E. In the following Dec. he reached $67^{\circ} 31'$ S., and on Jan. 30, 1774, the ice prevented him from proceeding further S. than $71^{\circ} 10'$ S. in long. $106^{\circ} 54'$ W. The next great step forward occurred in 1819, when William Smith discovered what are now called the South Shetland Islands. In 1821 Bellingshausen, a Russian, discovered Peter I Island and Alexander I Land.

James Clark Ross in command of the Erebus and of a British Antarctic expedition; Commander F. R. M. Crozier was appointed to the Terror, the second ship of the expedition. In Jan., 1841, the two ships broke through the Antarctic ice pack and found open sea, and sailed onwards straight towards the S. magnetic pole, until stopped by land at Cape Adare with Mt. Sabine (10,000 ft.) in the distance. Ross discovered the Admiralty Mts., Possession Island, Coulman Island, Mt. Melbourne, Franklin Island, and finally the volcanic mts. Erebus and Terror, and Cape Crozier. East of the latter Ross

sailed along the edge of the Great Ice Barrier; he had made the first voyage beyond 75° S., and his name is attached to the great Antarctic bay which he discovered. The extent of South Victoria Land was first suggested by his discoveries. In each of the following seasons attempts were made by Ross to reach the high latitudes, the best effort being $71^{\circ} 30'$ S. in the Weddell Sea in March, 1843. For thirty years after this no great progress was made.

On Dec. 21, 1872, the Challenger expedition sailed for the S., and on Feb. 16, 1874, the Challenger was the first steam vessel to cross the Antarctic Circle. No land discoveries were made, but the examination of the sea floor showed the presence of fragments of glaciated gneiss, granite, quartzite, etc., indicating the existence of the ice-bound continent of Antarctica.

King Oscar II Land was discovered by Larsen in 1893, his ship, the Jason, being the second steamer to cross the Antarctic Circle. In 1897 the Belgica sailed from Antwerp, under Adrien de Gerlache, with a company which included Roald Amundsen, Dr. Cook, and Henryk Arctowski; the ship was gripped by the ice in March, 1898, at $71^{\circ} 30'$ S., and for the first time an exploration party spent the winter in the Antarctic. Borchgrevink led the Southern Cross expedition in 1898, and a party of ten wintered near Cape Adare on the mainland, while the ship went back to New Zealand; in 1900 the party were taken on board and the Southern Cross explored part of the Great Ice Barrier.

In 1901 R. F. Scott sailed in the Discovery and landed a party at



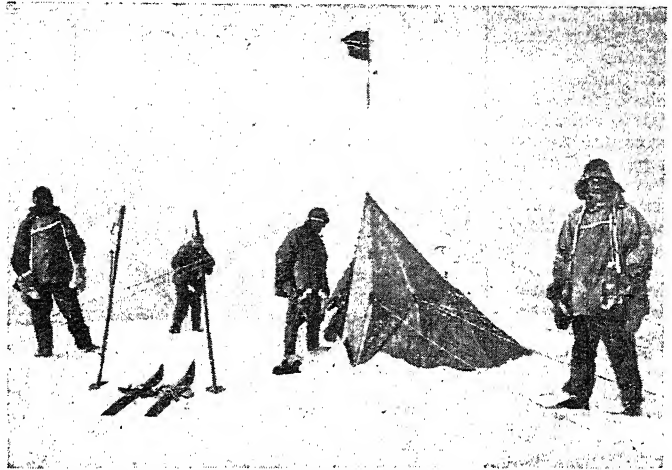
James Weddell, a Scotsman, reached $74^{\circ} 15'$ S. in 1823, in the great bay to which his name has been given. Enderby Land was seen in 1831 by Biscoe, a captain in the service of the Enderby Brothers; the next year Biscoe discovered Adelaide Island, the Biscoe Islands, and Graham Land. John Balleny was sent southwards by the same merchants and discovered the islands which bear his name in 1839. A French sailor, D'Urville, made Adélie Land in 1840, and in the same year Wilkes, of the U.S. Navy, sailed along the coast of Wilkes Land. Although later explorers have found open sea in some parts of the area where he claimed to have found land, yet his discovery went a considerable way towards developing the idea that there was a continuous land mass to the S. of Australia.

In 1839 the Admiralty placed

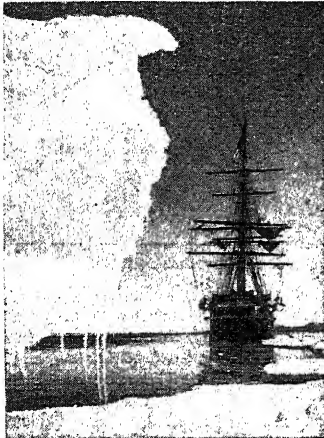


Antarctic Exploration. Scott's expedition, 1910-12. The crew of the Terra Nova in their cabin. Above: Members of the Amundsen expedition proving themselves at the South Pole, Dec., 1911

the foot of Mt. Terror on Ross Island on Jan. 22, 1902. The ship, before taking up her winter quarters, followed the Great Ice Barrier eastward and discovered King Edward VII Land. Winter was passed in McMurdo Sound, and next spring sledge journeys were made S. over the Barrier Ice. Scott led one party, which discovered Mt. Markham and reached $82^{\circ} 17' \text{ S.}$, 370 m. from the ship, without being able to gain land to the S. or to set foot on the great S. extension of South Victoria Land, visible to the W. of the Great Ice Barrier. The Discovery could not be freed from the ice during the summer, stores were obtained from the relief ship, the Morning, and a second winter came on. The next spring Scott led an expedition due W. over South



Antarctic Exploration. Captain Scott (left) and his companions discover the tent left at the South Pole by Amundsen, who had reached it 32 days earlier



Antarctic Exploration. Captain Scott's vessel, the Terra Nova, amid the polar ice

Victoria Land and penetrated 300 m. from the ship. The Discovery was set free from the ice, and with the relief ships Morning and Terra Nova left the Ross Sea.

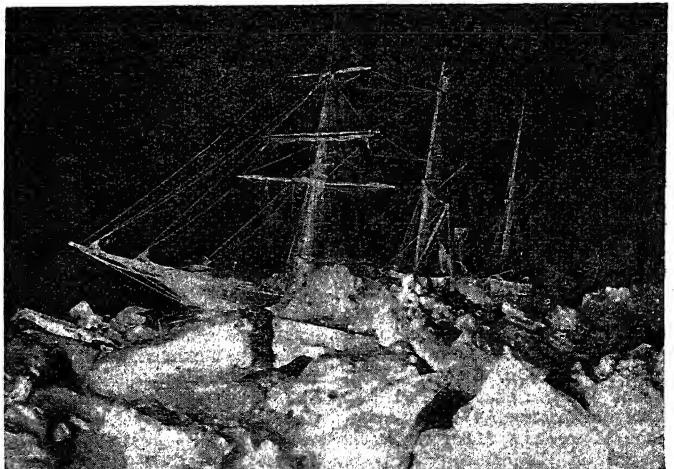
Drygalski sailed in the Gauss in 1901 from Hamburg, discovered Kaiser Wilhelm II Land, and wintered in the neighbourhood of the Gaussberg. Otto Nordenskiöld, in the Antarctic, reached King Oscar II Land, where he wintered. W. S. Bruce sailed in the Scotia in 1902 from the Clyde, wintered at Laurie Island, and in 1904, after refitting at Buenos Aires, the Scotia reached $74^{\circ} 1' \text{ S.}$ at Coats Land on the shores of Weddell Sea. Mossman remained for meteorological work until 1905 on Laurie Island at the station which had been established there. Charcot, in the Français, made explorations in Palmer Archipelago in 1903-4-5.

On New Year's Day, 1908, Shackleton, who had been with Scott on his famous sledge journey

over the Barrier Ice, left New Zealand in the Nimrod, and wintered near Cape Royds, the Nimrod returning to New Zealand. Mt. Erebus was ascended in March. He set out polewards over the Barrier Ice in Oct., climbed the Beardmore Glacier in Dec., and reached $88^{\circ} 21' \text{ S.}$ on King Edward VII Plateau on Jan. 9, 1909, an advance on the previous farthest S. of some 420 m. A second sledge party, led by David, pushed N., ascended the plateau near Mt. Bellingshausen, and discovered the South Magnetic Pole in $72^{\circ} 25' \text{ S.}$, $155^{\circ} 16' \text{ E.}$, at an elevation of 7,260 ft., on Jan. 16, 1909. Charcot made a second Antarctic voyage in the Pourquoi-Pas? and explored Bellingshausen Sea in 1909-10. Charcot Land appears on the map to define his discoveries.

Roald Amundsen left Norway on the Fram in Aug., 1910, and reached the Bay of Whales on the edge of the Great Ice Barrier on Jan. 14, 1911; winter quarters were established, and the ship went back to Buenos Aires. The dash for the Pole began on Oct. 20. The inner edge of the Barrier Ice was reached on Nov. 17, at 85° S. , the Axel Heiberg glacier was climbed, and the Pole was reached on Dec. 16, 1911.

Scott left London on the Terra Nova on June 1, 1910, winter quarters being prepared in Jan., 1911, on Ross Island. Sledge parties set out S. in Oct., and on Jan. 4 Scott and four companions, Wilson, Bowers, Oates, and Evans, went onwards from lat. $87^{\circ} 35' \text{ S.}$ and reached the Pole on Jan. 18, 1912. On the journey back Evans



Antarctic Exploration. Sir Ernest Shackleton's ship, the Endurance, closely beset by the floating ice and drifting northwards in 1915

From "South," by Sir Ernest Shackleton. London: William Heinemann

and John Rymill (Great Britain) revolutionised the whole nature of Antarctic exploration. Great hopes were raised at the beginning of aeroplane flights in the Antarctic that fresh features would be noticed and photographic surveys used to chart mountain chains and tablelands, and, in fact, many inaccessible parts of the South Polar continent. These hopes were certainly realized.

Wilkins found a practicable landing-ground for aircraft on the shores of the great land-locked harbour of Deception Island. On Dec. 20, 1928, he flew south on the meridian of 61° W. across Graham Land to 64° S., and after ascending to 8,200 ft. was able to observe the mts., capes, and islands charted by the Scandinavians, Larsen and Nordenskjöld. He flew across the Antarctic Circle, and on to 71° 20' S., 64° 15' W., taking important photographs.

The following summer season Wilkins pursued his explorations by air from the Discovery Committee's ship William Scoresby. On Dec. 29, 1929, he flew from the edge of the pack-ice at 68° S., 75° W., over the Bellingshausen Sea down to Charcot Is., beyond 70° S. His final flight took him over pack-ice and bergs to 73° S.

Byrd's Expeditions

Richard E. Byrd had already gained a store of flying knowledge in the Arctic before he set out on his magnificent and costly South Polar enterprise. Money was no object; Byrd's two expeditionary ships *City of New York* and *Eleanor Bolling* alone cost the expedition nearly 300,000 dollars when fitted out and equipped. Byrd in his journal quotes the headlines of a contemporary newspaper: Million dollar expedition has magnificent equipment—costliest on record. By his results the expenditure was justified.

Establishing a base on the Great Ice Barrier, in the Bay of Whales, Jan., 1929, the *City of New York* landed the advance party with dogs, stores, and equipment. The *Bolling* came alongside three weeks later, and landed a Ford 3-engined aeroplane and three smaller machines. A landing ground was made, and Little America, Byrd's first-class base, was constructed. A base-laying flight was undertaken, and enough petrol and lubricating oil (with food, etc., for two months) placed in a depot on the Barrier at the foot of the Axel Heiberg Glacier, Queen Maud Range, to fly 500 m. home over the Barrier.

Ten important flights were made. The first extensive flight was to the E., Jan. 27, 1929, when Byrd, flying over King Edward VII Land, S. of Scott's Alexander Range, discovered a new range between 78° 14' S., 153° 15' W., and 77° 35' S., 153° 5' W., which he named Rockefeller Mts.

A second flight in the same direction was made on Feb. 18, and a further range was discovered E. of 150° W., running S.E. This range formed a boundary of some high land still farther E., which Byrd named Marie Byrd Land. This new land was again flown over and photographed for survey purposes. On March 7 Prof. Larry Gould flew to the Rockefeller Mts., landed in 78° 9' S., 154° 27' W., and camped for 15 days for a geological survey.

Various sledge journeys were undertaken after the winter, including one made by the geological party from the Axel Heiberg Glacier base, for the establishment of W/T communications and weather reports, upon which the success of the Polar flight was so largely to depend.

The flight to depot stores and fuel at the Barrier base was made on Nov. 18, 1929. New mountains were seen, and named Bob Range. Byrd, after experiencing the most hazardous adventures imaginable, gained excellent experience, which was to help him immensely in the Polar flight itself. This he undertook on Nov. 28 and 29. Accompanied by Balchen, June, and McKinley, he reached the plateau by way of Liv Glacier. Flying on S. he circled the S. Pole and returned to the Barrier by the Axel Heiberg Glacier. Valuable photographs were taken on this journey.

On Dec. 5 another important flight to the E. of King Edward's Land as far as the 145° meridian resulted in the discovery of a range of mountains running N. and S. in 144°. This was followed from 75° to 77½° S. It was the N. extension of the Marie Byrd Mountains, and showed that the coast trended N.E., then after a slight bend turned S.

Byrd's airmen made two further flights, surveying the Bay of Whales from the air, and Gould's party completed their sledging expedition to Queen Maud Mts. and climbed 6,500 ft. up Mt. Nansen. This remarkable expedition left for New Zealand and home in Feb., 1930.

Byrd returned to the Antarctic in 1933 to complete his work, using the *Bear* of Oakland and the

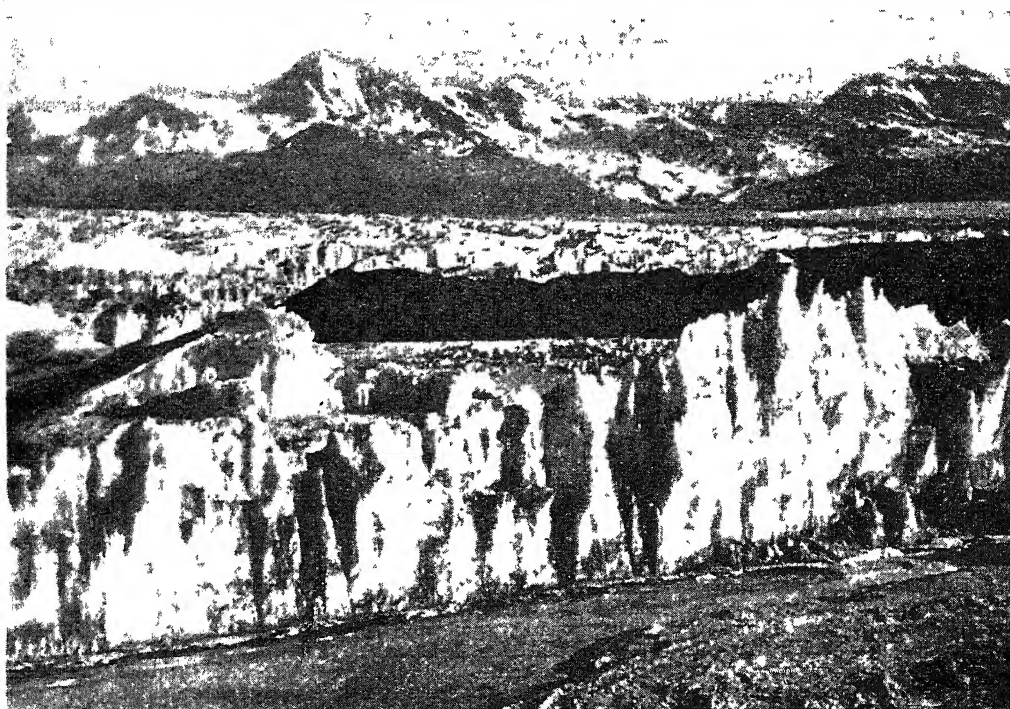
Jacob Ruppert. Echo sounding from the *Bear* showed depths of over 4,000 metres in 75° 20' S., 148° 15' W. Byrd had with him 55 men in what must now be called the village of Little America, where electric light and power, a broadcasting plant, tractors, aeroplanes, dog-teams, repair shops, a library and science hall, a dairy with three cows and a young bull-calf, and a mess hall seating 28 men, were to be found together with a variety of other structures and underground habitations. There was even a U.S. post office.

Tractor sledge parties established a depot 100 m. to the S. covering 50 m. a day, this being ten times as much as Scott's motor sledges could do.

A hut was erected 120 m. S. of Little America and furnished with supplies to enable one man to live through the winter. Byrd himself took on this duty, attending to the observations throughout this dark period. The minimum temperature experienced was 80° below zero. Byrd was in W/T communication with the base throughout his stay. When, in late winter, his messages became terse and irregular, a relief party set out to succour him. Arriving on Aug. 11, after a difficult journey, they found Byrd to be very weak and ill through poisoning from the fumes of his kerosene stove. For six weeks he had been too ill to prepare food, and he actually lived mainly in his sleeping bag in a half-frozen state, existing on the contents of tins stored under his bunk. Eventually he improved the ventilation, reduced the fumes, and made efficient use of his stove, after which his condition improved. During the whole of his stay until the arrival of the relief party he had managed to complete the meteorological and auroral observations. He was flown to the base Oct. 13, 1934.

Sledge journeys explored Marie Byrd Land and the Queen Maud Mts., using mainly dogs and tractors. The Queen Maud Range party were supported a month after their departure by a party in a Condor biplane. The party camped 182 nautical m. from the Pole, and discovered numerous new mountains and glaciers as well as beds of coal. Air flights made between Nov. 15 and 25 dispelled Byrd's belief that a transcontinental strait divided the Antarctic into two land-masses.

NORWEGIAN EXPEDITION, 1933-1934. Capt. Røiser-Larsen, who



Antarctic Exploration. The vast white south polar regions have an impressive beauty all their own. Here in the foreground are seen glacier and moraine, backed by towering cliffs, a high icy plateau, and mountains up to 15,000 ft.

Photo, Frank Debenham

ater commanded the Royal Norwegian Air Force in Great Britain during the Second Great War, set out in 1933 to explore the sector of the Antarctic between Enderby Land and Coates Land (longitude 50° E.— 30° W.). Enderby Land was sighted on Feb. 8, 1934, across an immense icefield, but two attempts to reach the land were frustrated by ice.

Riiser-Larsen used the Norwegian ships Thorshavn and Thorshammer, then engaged in whaling. He also worked from whale-catchers, which from their handiness and light draught made it possible for him to land 50 dogs and 100 cases of equipment on the ice, to the E. of Princess Ragnhild Land. But during establishment of the base, the ice broke up, and dogs and gear became isolated on small floes. On March 8 the situation had become so grave with the complete break-up of the ice that a wireless message was broadcast, and the whaler *Glove 5* rescued the party from an iceberg on Mar. 11. Without dogs or equipment it was impossible to continue the expedition.

CHRISTENSEN'S CRUISE, 1933-1934. Although the object of the Norwegian Lars Christensen's

cruise in the whaling factory ship Thorshavn was to inspect the whaling ships of his company, he carried out a good deal of exploratory work, including meteorological, hydrographical and geographical exploration. A *Cirrus-Avian* seaplane was carried, and two short flights were made in latitude 65° S. and longitude 66° E. A new line of coast was sighted stretching W. for 150 m., and named after Princess Astrid. Christensen completed the circumnavigation of the Antarctic continent, and reached lat. $71^{\circ} 44'$ S., long. $134^{\circ} 11'$ E. in the part of the Ross Sea which was at that time practically unexplored.

His cruise lasted 70 days, and during the latter part a new bank, named Sars Bank, was discovered S. of Cape Horn.

ELLSWORTH EXPEDITION, 1934-1935. The plan of the American, Lincoln Ellsworth, was to fly across the Antarctic from Weddell Sea to Ross Sea. Using a low-wing Northrop monoplane, he followed the east coast of Graham Land for 500 m., across a mountain range reaching to 12,000 ft. (the Eternity Range), then an even higher range, which he named the Sentinel Mts. A further chain was seen on the S.

horizon 100 m. away. Low visibility compelled him to land his machine after a flight lasting nearly 14 hours. Camp was made in $79^{\circ} 12'$ S., $104^{\circ} 10'$ W. at a height of 6,400 ft., on a plateau named after Ellsworth's flight companion, Hollick-Kenyon.

The two fliers took off again on Nov. 27, but were again forced down and remained in camp for three days. Starting at midnight, in improving weather conditions, they flew on for nearly an hour, but a severe blizzard forced them to land a third time and remain another three days in camp. On Dec. 4 another start was made, but poor visibility forced them to land in latitude $70^{\circ} 17'$ S., $153^{\circ} 16'$ W. On Dec. 5 they took off again, and flew over the plateau until within a few miles of Little America, their destination. Fuel ran out, and they made their last landing. After four days in camp they dragged a home-made sledge on to the abandoned huts of the Byrd expedition, where they arrived Dec. 15, to be rescued ultimately by *Discovery II*.

This magnificent flight of 2,340 m. was not only productive of topographical results, but set a new standard for Polar aviation,

in that four successful landings were made on the way for the purpose of fixing positions and avoiding bad weather.

BRITISH GRAHAM LAND EXPEDITION, 1934-1937. John Rymill, with the motor schooner *Penola*, worked in a previously unvisited part of Antarctica, and made two major discoveries: (1) that Graham Land is part of the Antarctic continent, not an archipelago as was previously believed; (2) that a great channel running approximately N. and S. separates Graham Land from Alexander Land. Rymill named this King George VI Sound. His little expedition carried a small aeroplane. With ship, sledge, and plane, its 16 members explored a great part of Antarctica and Sub-Antarctica between latitudes 63° and 73° S., and longitudes 55° and 75° W.

The charting of Antarctica was continued during the years of the Second Great War and after by representatives of the U.K., U.S.A., Norway, and Argentina. See N.V.

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Antarctic Ocean. Name conveniently applied to the waters of the Atlantic, Pacific, and Indian Oceans which girdle the Antarctic continent. It is also frequently called the Southern Ocean. The arbitrary northern limit of the ocean is lat. 60° S., where it merges with the Southern Ocean. The chief seas of the Antarctic Ocean are the Weddell Sea, between Graham Land and Coats Land; and the Ross Sea, between South Victoria Land and King Edward VII Land. The name Bellingshausen Sea is used for the waters to the W. of Graham Land and N. of Charcot Land. Except in the vicinity of Graham Land there are few islands in the ocean; the chief groups are the South Shetlands, South Orkneys, and South Sandwich Is., N. of the Weddell Sea, and the Balleny Islands, N. of Victoria Land.

The Antarctic is the shallowest of all the oceans, the depths

averaging 2,000 fathoms or less. One of the few deeps over 3,000 fathoms is the Ross deep in the Biscoe Sea, the area of which has been greatly restricted by the researches of the Scotia. A submarine ridge, probably under 1,000 fathoms in depth, connects Graham Land with South America via the South Orkneys, the South Sandwich Is., and South Georgia. There are less certain indications of a submarine ridge between Victoria Land and Tasmania. Evidence is lacking of former land connexions between Antarctica and S. Africa, but that part of the Antarctic Ocean has been even less adequately explored than others. The bottom deposits are mainly blue mud of terrigenous origin carried seaward by glaciers from Antarctica, and towards the northern limits of the ocean a band of varying width of diatom ooze, derived from the siliceous tests of the chief organisms of the surface waters. Surface water temperatures are under 40° F. throughout the year, and frequently fall to 28° F. Bottom temperatures range about 31° F.

In winter the whole ocean is frozen or blocked with pack-ice: in summer the pack is loose, but invests most of the coasts. The salinity is low owing to the influx of fresh water from the wastage of icebergs and to the slight evaporation. The proportion of dissolved nitrogen and oxygen is high. Density, owing to the low temperatures, is relatively high. Near the continent there is a narrow zone of westerly current; this is turned northwards by the E. coast of Graham Land, and ultimately flows eastward. Surface organisms are mainly diatom and other lowly plants. In shallow water there is a wealth of invertebrate life; seaweeds are numerous. Fish are abundant, and various species of whales are found, source of a profitable industry. No trade routes touch the Antarctic Ocean, which is visited only by whalers and exploring vessels. See map p. 480.

Antares (Greek *anti*, compared with; *Arēs*, Mars). Giant red star at the heart of the Scorpion. known also as Alpha Scorpii. It is a double star of which the primary star, or sun, is of the first magnitude. It is one of the few stars of which the diameter can be directly measured by means of the stellar interferometer (*q.v.*). Its radius is 450 times that of the sun. See Scorpion.

Anteater. Popular name given to any of a number of almost unrelated animals united only by their common habit of eating ants or other insects. In all of them the teeth are reduced or absent, and because of this the name Edentata was used to denote most of them collectively. The group thus set up is a false one, and the use of the word should be discontinued. In Australia the spiny anteater (*Echidna*) is a relative of the duck-billed platypus, with which it makes up the group called the monotremes. These mammals



Anteater. One of the great anteaters, *Myrmecophaga jubata*, of S. America

lay eggs. Superficially *Echidna* resembles a hedgehog, but in detail it is very different. In Asia, and extending into Africa, is the scaly anteater, or pangolin (*Manis*), which looks like an animated fir-cone. Confined to Africa is the Cape anteater, or ant-bear, called in Dutch the aardvark (*Orycteropus*). It resembles a pig with a long tongue.

In S. America there is a group of animals fairly closely related to each other though remote from those already mentioned. They are sometimes called the hairy anteaters. They all have long thin tongues, and because of this the group is called the Vermilingua. The largest of them, about four feet long, is the great anteater (*Myrmecophaga*), found in tropical S. America. It is grey and brown in colour, with a bushy tail. It has powerful digging claws turned inwards, on which it walks awkwardly. The lesser anteater, or tamandua, is about half the size of the great, and has a tail like that of a rat. The two-toed, or pygmy anteater, about 6 ins long, lives in trees like a sloth, in the hottest parts of S. America. It is reddish in colour, with a prehensile tail. It eats the contents of the nests of insects built in trees, whereas most anteaters dig for food.

Antecedent (Latin *antecedens*, going before). In logic (1) that part of a conditional proposition on which the other depends (if A is, B is); (2) the first part of an enthymeme. The latter is a

syllogism containing two propositions: "I think, therefore I exist," where the major premise "all that thinks, exists" is omitted.

Antelope. A large group of mammals of the family Bovidae. The term is generally applied to all ruminants that cannot well be described as cattle, sheep, or goats. Most antelopes are graceful and deer-like, bearing horns which are usually long, cylindrical, more or less ringed, and more solid than those of oxen, sheep, or goats. Antelopes usually have glands beneath the eyes, which never occur in cattle and goats.

All the numerous species of antelope are confined to the Old World, the so-called prong-horn antelope of America belonging to a separate family. Most are natives of Africa, but a few are found in Syria, Arabia, India, and Tibet. In Europe they are represented by the chamois of the Alps, but it is a matter of dispute whether this animal should be included in the group. In size they range from the hartebeest, which stands about 5 ft. high at the withers, to the little duikers, some of which are no larger than a rabbit with long legs.

Antennae (Latin *antenna*, sail-yard). The horn-like feelers on the head of insects, crustaceans, and



Antelope. *Cobus defassa*, a species which is native to Africa
Photo, Gamber Bolton, F.Z.S.

certain other animals. Insects have only a single pair of antennae, but in crustaceans, such as the crab and lobster, the number is usually more. They are frequently of elaborate structure, as in some moths and gnats, and great care is taken to keep them clean.

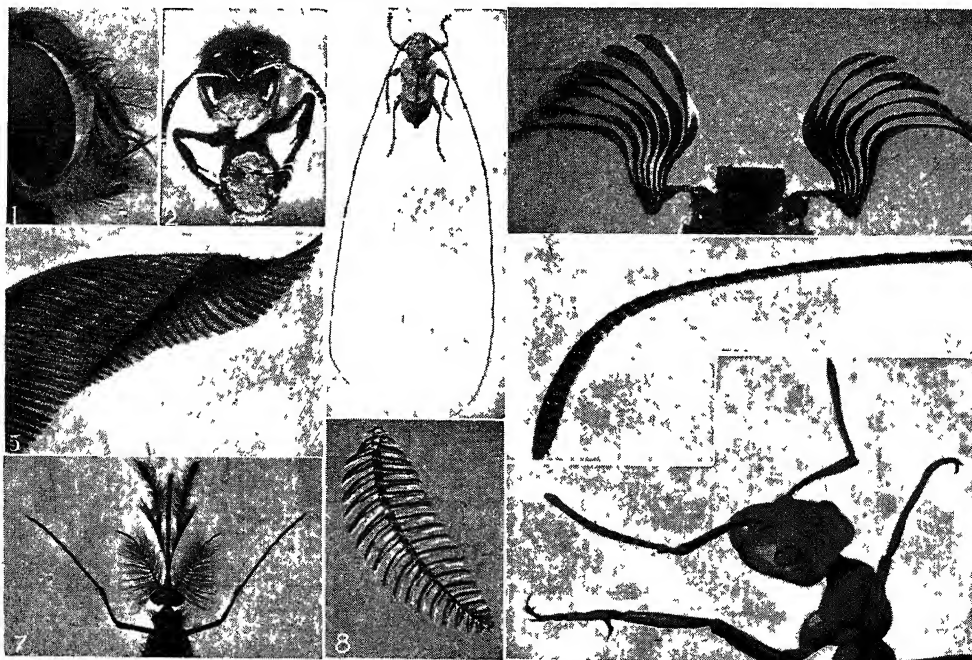
In the larval stage of certain crustaceans the antennae are used as swimming organs, but in adults and in insects they evidently perform sensory functions. Lobsters and crabs feel their way and possibly discover their food by their means, while ants appear to recognize one another and possibly communicate by means of these

organs. Two ants when meeting usually touch each other's antennae, which, it is thought, perform olfactory functions.

Antequera. Town of Spain, in Malaga province. Called Antiquaria by the Romans, it is 28 m. N.N.W. of Malaga, on the Algeciras-Granada Rly., and has a Moorish castle, remains of the city wall, and an arch built partly of Roman masonry in 1595. It trades in wine, oil, and fruit, and manufactures woollens, paper, leather, sugar, and soap. Near the town, which was taken from the Moors in 1410, is one of the largest grave-mounds in Spain. Pop. 31,950.

Anthelion (Greek *anti*, against; *helios*, sun). Concentric rings, halo, or colourless mock sun, seen round the shadow of an observer, who, standing with his back to the sun, is gazing upon a moist surface, such as a cloud, fog, or dewy grass. The phenomenon is produced by diffraction of light, and is observed when the moist surface has the same angular altitude as the sun.

Anthelmintic (Gr. *anti*, against; *helmins*, worm). Medical term for a remedy which destroys or expels intestinal worms. Those preparations which destroy the parasites are known as vermicides, and those which expel them are



Antennae. Feelers of various insects (some highly magnified). 1. Antennae of the blow-fly. 2. Whip-like antennae of the hornet. 3. The long antenna of the North European timberman beetle. 4. Antennae of the male cockchafer. 5. Antenna of the silkworm moth. 6. Antenna of a butterfly. 7. Antennae of the male gnat. 8. Antenna of the male emperor moth. 9. Whip-like antennae of a worker wood ant. Great care is taken by insects to keep the antennae clean

called vermifuges (Lat. *vermis*, worm; *caedere*, to kill, and *fugare*, to put to flight).

Anthem (Greek *anti*, against, *phōnē*, sound or voice). Vocal music with sacred words, with or without accompaniment. In the Church of England its place is after the third collect of Morning or Evening Prayer. The early English anthems were contrapuntal in character, and their form grew out of the motet. In the first half of the 17th century solos began to be introduced, and were used with greater freedom later, together with duets, trios, and quartets, and free accompaniments were added for organ and other instruments by Humfrey, Purcell, and other composers of the post-Restoration period. Modern anthems are very free as to form; and they range from the calibre of a simple part-song to the dimensions of a sacred cantata. See National Anthems.

Anthology (Gr. *anthos*, flower, *legein*, to select). Collection of selected poems or prose extracts. The oldest collection is that generally known as the Greek Anthology. The first Greek Anthology was formed in the 1st century B.C. by Meleager; in the 10th century A.D. Constantine Cephalas made the great collection that has come down to us. In the 14th century a Byzantine monk, Maximus Planudes, expurgated and rearranged the Anthology, and his version was printed at Florence in 1494, and remained the only one known until Salmassius discovered the original text of Cephalas at Heidelberg early in the 17th century.

This great find, containing selections from 300 Greek poets, was removed to the Vatican Library after the Thirty Years' War, and to Paris after Napoleon's successes in Italy, but was returned to Rome in 1816. It was published by R. F. P. Brunck, 1772-6, and by F. C. W. Jacobs, 1794-1814, and has become the text drawn upon by all translators. There have been several translations into English of selections from the Greek Anthology. Latin anthologies, more or less on the Greek plan, were first compiled in the 16th century by Scaliger, 1573, and Pithoeus, 1590; one by A. Riese, 1869-70, contains nearly 1,000 poems. There are anthologies in many Oriental languages.

Anthologies of English poetry and prose are innumerable. A pioneer and classic volume was The Golden Treasury, compiled by F. T. Palgrave with Tennyson's

help in 1861 and expanded several times. Sir A. T. Quiller-Couch's Oxford Book of English Verse, 1900, was the first of a series of Oxford Books devoted to different periods and subjects, such as 16th century verse, Christian verse, or ballads. Robert Bridges' The Spirit of Man (verse and prose), 1916, was paralleled by Sir Bruce Richmond's The Pattern of Freedom, 1940. The Week-End Book, 1923, was typical of lighter anthologies. Van Doren's Anthology of World Poetry appeared in 1929. In 1934 Martin Armstrong and Rose Macaulay edited respectively collections of verse and prose on The Major Pleasures of Life and The Minor Pleasures of Life.

Plays, essays, letters, and short stories have also been collected and a modern feature has been the development of the specialised anthology devoted to a particular period (e.g. the best plays or short stories of a given year). The B.B.C. has adopted the term anthology for a short reading of miscellaneous verse or prose.

Anthony of PADUA (1195-1231). Franciscan saint and preacher. He was born at Lisbon of a noble family, and entered the Order of Friars Minor (Franciscans) at the age of 25, after he had been for 10 years an Augustinian monk, the greater part of that time being spent in prayer and study. He was appointed by S. Francis to instruct the order in theology, but he was chiefly famous as a preacher in S. France. He died at Vercelli, near Padua, June 13, 1231, and was canonised by Gregory IX in 1232. In the spirit of S. Francis, Anthony was the friend of all animals, not disdaining to preach to them on occasion. His help is popularly invoked for the recovery of lost goods, and his festival is kept in the Roman Catholic church on June 13. The great church of Sant' Antonio at Padua contains his tomb.

Anthony of THEBES (c. 251-356). Christian saint and hermit, generally known as S. Anthony the Great. Born at Koma in Upper Egypt of Christian parents, at an early age he devoted himself to a religious life. He sold his property, gave the proceeds to the poor, and retired to a remote part of the Nile valley, where he lived as a hermit until 305. By this time his fame had spread, and many wished to live under his guidance. He therefore established the first Christian monastery near Memphis, which ultimately comprised about 15,000 monks.

The community of S. Anthony included a number of hermitages, the monks living in solitude in scattered cells, but observing certain rules in common, and owing obedience to the superior. In extreme old age S. Anthony travelled to Alexandria to oppose the Arians, but returned to his hermitage to die. S. Anthony's temptations in the desert, the subject of more than one famous picture, and of a novel by Flaubert, have no foundation in history. The main facts of his life are derived from the writings of S. Athanasius. See Monasticism.

Anthony, C. L. Pseudonym used until 1935 by the British playwright Dodie Smith (q.v.).

Anthony Adverse. Historical novel by the American author Hervey Allen (q.v.), published 1933. It is a long romantic story of the life and loves of a founding, told with a wealth of accurate period detail and vividly depicted backgrounds changing from Europe under Bonaparte, first to the W. Indies, then to the slave-trading coast of W. Africa, and finally to the southern states of America in the early 19th century. It was filmed in 1936, with Fredric March in the name part.

Anthophyllite (Greek *anthos*, flower; *phyllon*, leaf). Member of the amphibole group of minerals. It is a non-aluminous magnesium silicate containing some iron. A more highly ferruginous variety containing alumina is known as gedrite. It differs from the other amphiboles in possessing orthorhombic symmetry, thus corresponding to hypersthene among the orthorhombic pyroxenes. It occurs only in metamorphic rocks, especially in those of Greenland.

Authorism (Gr. *anti*, against; *horos*, definition). In logic and rhetoric, a counter definition, one differing from and counter to that which has already been put forward. See Logic.

Anthozoa (Gr. *anthos*, flower; *zōon*, animal). A large class of marine organisms including corals and sea-anemones. See Coral Sea-anemone.

Anthracene (Gr. *anthrax*, coal). Solid hydrocarbon obtained from coal-tar, symbol $C_{14}H_{10}$. In distilling tar various products are obtained according to the temperature. Between 570° F. and 680° F. heavy oils come over, known as anthracene oil, which deposits crude anthracene on cooling. This is afterwards purified by pressure, solution in hot benzene, and crystallisation. Anthracene is em-

ployed for the manufacture of alizarin, which on this account is known as anthracene red.

Anthracite. Non-bituminous variety of coal containing a high percentage of carbon. Anthracite burns slowly with very little smoke or flame, and throws out great heat. The average composition is: fixed carbon, 80-90 p.c.; volatiles, 5-7 p.c.; ash, 3-8 p.c.; sulphur, 1-2 p.c. The calorific value is about 12,600-15,000 B.Th.U. per lb.; the density is 50 lb. per cubic foot. In commercial classification, anthracite is coal which contains less than 10 p.c. volatiles. "Anthracitic coal"—sometimes called semi-anthracite—contains 10-16 p.c. volatiles. Anthracite is found in great quantity in S. Wales, in Pennsylvania, and in Canada. See Coal.

Anthraquinone. Substance occurring in the form of yellow needles, symbol $C_{14}H_8O_2$. It is prepared by dissolving anthracene in glacial acetic acid and adding chromic anhydride to the hot solution. On adding water the anthraquinone formed is precipitated and further purified by sublimation. It is used in the manufacture of derivatives, mainly dyestuffs and intermediates, such as alizarin.

Anthrax (Greek *anthrax*, coal, carbuncle). Disease which affects mainly sheep and cattle, but also at times human beings. It is a widely distributed, specific, infectious disease caused by the presence of the *Bacillus anthracis* in the blood. The carnivora, especially the dog, are relatively immune from the disease.

In cattle, cases of anthrax usually occur singly. The disease is extremely rapid, death occurring in a few hours, with rapid decomposition, although cases of recovery are recorded. The temperature rises to a high point;

there is progressive weakness, with difficulty of breathing; and blood escapes from the external orifices. After death the spleen is found to be very much enlarged, hence the disease is sometimes termed splenic apoplexy in cattle. In Great Britain horses and sheep are rarely affected, the disease being more common in pigs.

Symptoms of Human Infection

Human beings usually become infected with anthrax as the result of their occupation, e.g. skinning and dressing carcasses, carrying hides, or manipulating wool. The symptoms in human beings vary with the way in which the infecting organisms find an entrance to the body. When infection is through a cut or injury on an exposed surface, such as the hands, arms, or face, the result is the formation of a malignant pustule somewhat resembling an angry carbuncle. The tissues in the immediate neighbourhood become congested, and then inflammation may spread to the lymphatic glands, with development of fever and signs of general illness. Sometimes the symptoms go no further and the pustule gradually heals, but more frequently the patient grows worse and dies from a generalised form of blood poisoning.

Among woolsorters and workers in hair, infection is more often due to inhaling the bacilli, the effect of which is to produce a rapid rise of temperature, pain in the chest, hurried breathing and cough and bronchitis. Extreme prostration follows, and death may occur within twenty-four hours. Infection may also occur through the stomach or intestines, from eating the flesh or drinking the milk of diseased animals. Bleeding from the mucous membranes may follow, and death occurs with symptoms of intense poisoning.

Treatment of malignant pustule consists of measures to prevent a general infection; the pustule is kept clean, but incision is not recommended. Large doses of anti-anthrax serum are given, sometimes in conjunction with arsenical compounds. It has also been shown that the bacillus of anthrax is sensitive to penicillin.

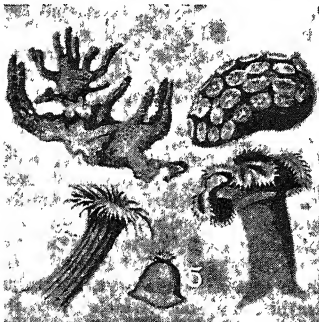
Prevention of the disease is exceedingly important, since infection is most often due to germs on pasture. The body of an animal which has died from anthrax should not be dragged over a field, but buried promptly, unopened, in a deep pit surrounded by quick-

lime; all straw and material known to have been in contact with the animal must be burned: yards should be thoroughly cleaned, and stalls and byres limewashed. Men who have handled the carcass must thoroughly disinfect their hands, and clothes soiled with blood, etc., must be steamed or boiled.

In Britain a case of anthrax occurring in a factory or workshop must be notified to the Home Office under the Factories Act, 1937. The Anthrax Prevention Act, 1919, prevents the importation into the U.K., either absolutely or except at specified ports and subject to conditions, of any goods infected or likely to be infected with anthrax. Persons who contracted anthrax while engaged in handling wool, hair, bristles, hides, or skins were entitled to compensation under the Workmen's Compensation Acts, anthrax being a scheduled disease under these Acts.

Anthropogeography (Gr. *anthrōpos*, man; *geographia*, geography). The study of physical environment as a factor in the history of mankind. It is thus complementary to the factors of race or ethnology and social environment or cultural anthropology. The convenience of the term, first introduced by Friedrich Ratzel in 1882, was recognized by the Royal Geographical Society.

More comprehensive than political or economic geography, which are special aspects of it, anthropogeography is concerned with the terrestrial influences underlying human migration in all ages and the variation of man's physical and mental characters. With the aid of physiography it studies differences of stature, pigmentation, muscular energy, viability, capacity for progress, and mental retardation. Not merely descriptive, it seeks to establish the principles that caused early man to cling to river-valleys, to pass from primeval hunting to pastoral nomadism upon the wide grasslands of temperate Eurasia, to develop the arts of life in the settled agriculture and primitive navigation of the Mediterranean basin, and to emerge from these nurseries of civilization to an adolescence of world-conquest through the medium of ocean travel. It accounts for the isolation of archaic types of head-form, culture, and speech in remote mountain fastnesses or distant islands. It discusses such social institutions as polyandry and infanticide in relation to food scarcity, and discerns



Anthozoa. 1. *Montipora* (coral).
2. *Coenopissammia Willeyi* (coral).
3. *Viduata* (sea-anemone). 4. *Actinobola Dianthus* (sea-anemone).
5. *Miniata* (sea-anemone)

the reason for terrace cultivation in restricted areas. It follows the path of trade along the roads of economic exchange predestined by the natural form of the land. See Anthropology; Ethnology.

Anthropoid Apes (*Anthropomorpha*). Those animals that come nearest to man in form and structure, and are included in the same natural order (Primates). They are without tails, have a single curve to the backbone, and the breast bone (*sternum*) is broad and flat as in man. The fore-limbs end in hands that are larger than the feet; and the thumb and great toe are both set at an angle to the other digits, and are opposable to them. The skull develops great bony ridges, to which are attached the powerful muscles that operate the jaws. The muzzle projects considerably, and the teeth agree in number and arrangement with those of man, but the canines attain a large size, especially in the male.

Unlike the monkeys, anthropoid apes have no cheek pouches. They can stand in a semi-erect atti-

tude, and when in this position the superior length of the arms causes the hands to reach below the knees—in the oranges as low as the ankles. On the ground they advance on all fours and on the doubled hand, only standing up to defend themselves. They live among the leafy branches of trees, feeding upon fruit and leaves, and building temporary platforms or nests of boughs and leaves on which to sleep. The group includes the gibbons (*Hyllobates*), the oranges (*Pithecius*), and the chimpanzies and gorillas (*Troglodytes*). They are natives of the Old World—Africa, Asia, and the islands of the E. Indies. See Monkey; Primates.

Anthropological Institute, ROYAL. A British learned society. It is a union of the Ethnological Society of London, founded 1843, and the Anthropological Society, founded 1863. They were amalgamated in 1870 and given the royal title in 1907. The offices are at 21, Bedford Square, London, W.C., where there is a library for the use of fellows (F.R.A.I.).

ANTHROPOLOGY: THE STUDY OF MAN

E. G. Harmer, Writer on Archaeology

This article deals with the growth of man's activities in what are called prehistoric times. The companion article on Man should be referred to for the development or evolution of man himself. See also Bronze Age; Family; Society; Totemism, etc.

The term anthropology (Greek *anthropos*, man; *logos*, science) was used by Otto Casmann, 1594–5, to denote the mutual relationship of human physiology and human psychology, and it bore that meaning until it acquired a wider one under the impulse given by the appearance of Darwin's *Origin of Species* in 1859.

Anthropology still recognizes, although in a different form, the duality involved in the earliest use of the word. Accordingly its two main divisions are (1) physical, the "natural history" of the human animal; (2) cultural, the study of civilization. These terms are to be preferred, because of their precision, to somatology, a name given to it by Bentham, or sociology, which was used by Herbert Spencer and Comte.

PHYSICAL ANTHROPOLOGY. The student begins by considering the place occupied by man in the animal kingdom. The comparative zoologist points out the similarity of man's physical structure to that of the anthropoid or man-like Primates, and endeavours to trace the course of human evolution.

The oldest fossil bones for which any human characters have been claimed are those of *Sivapithecus indicus*, discovered by Dr. Guy

Pilgrim in 1915 in a zone corresponding to the Middle Miocene of Europe. That in so remote a geological epoch tropical forests may have harboured erect arboreal anthropoids is not in dispute. This is not to say, however, that they had advanced beyond the quadrumanous stage, with all four limbs used as prehensile hands. The earliest known form in which the lower limbs were adapted for walking on the ground is the Java ape-man, *Pithecanthropus erectus*, of the Pliocene age. To that age, therefore, the origin of two-handed, two-footed man is, on our present evidence, to be attributed. That there were Miocene precursors is a necessary inference, but they were probably essentially pre-human.

The substantial period of time implied in these processes is the affair of geology, and still matter for inquiry, but it is sufficient to say that the totality of human history is in any event measurable in myriads of years.

ORIGIN AND DISTRIBUTION OF RACES. Exact methods of measuring the human body elicit more or less constant characters in mankind when grouped into races. But no ethnic classification yet devised completely accounts for

the facts. The primary races developed their distinctive characters in wide isolated "areas of characterisation" in a remote past. Since that time racial intermingling has been active, although new racial types are not necessarily due more to admixture than to environment. The study of racial origins, and of the distribution of mankind over the globe is the task of ethnology.

UNITY OF THE SPECIES. Of primary interest is the question, do all modern types of man descend from a single ancestral form, or did two or more branches from the anthropoid stem lead to the independent development of the main ethnic stocks? A two-fold ancestry was urged in 1909 by Professor Klaatsch, who derived Neanderthal man from an African stem whence the gorilla also sprang, and Aurignacian man from an Asiatic stem which also yielded the orang-utan. The suggestion met with disfavour, and the monogenist theory holds the field so far as modern man is concerned.

One Human Species

Existing races have never passed beyond the stage of inherited "breeds" or zoological "varieties." There is to-day but one human species, known as *Homo sapiens* (Lat., man the knowing). The biological test is conclusive—any interracial union produces fertile offspring. All breeds, however, are not equally educable, because mental culture is conditioned by brain development. The repugnance of the highest races for mating with the lowest is based upon a reasoned psychology. The consideration of this and cognate themes belongs to Eugenics.

CULTURAL ANTHROPOLOGY: MATERIAL FOR STUDY. The anthropologist as such puts forward no explanation of the problems of life, mind, and soul. They are, in part, the affair of psychology. His task is limited to observing their manifestations in human culture. In the absolute sense uncultured man would not be man at all. The cultural history of mankind begins at the same moment as the physical. Like the physical, the cultural might be studied with reference to its origin and antiquity, its racial distribution, and its witness to the unity of the human mind.

Man may be said to have become differentiated from the brute creation—with its unthinking subservience to environment—when first brain and hand began to react upon each other. His erect posture was inherited from arboreal precursors; when he descended to the ground and walked

firmly upon the earth, the hands were released for manual uses, and man the tool-maker began. Hence all culture has sprung. This is the main preoccupation of anthropology, because culture in all its forms belongs to man alone. The work of man's hands is embodied in technology and the arts, including the technological fossils revealed by archaeology. His social institutions, having their visible expression in customs, pertain to social anthropology.

FOOD QUEST. At the ultimate base of human action lies the quest for food. That primeval man limited his dietary to fruits and roots cannot be proved by direct evidence. When, however, he began to hunt—on land and water—for animal food, he called in the aid of sticks and stones. Amid the profusion of a tropical jungle there was lacking the incentive to community of action, from which society originated. This was to come when man was confronted by the problems that beset his path as he began to go about the world. Thus by following the herds of food-animals in their daily and seasonal wanderings—which ultimately led him to Europe—he embarked upon a nomadic life that endowed him with new powers of intelligence and resource. This factor of the physical environment is the concern of anthropogeography, the study of geographic control.

FAMILY LIFE. In that primeval age which we might call pre-archaeologic family life was already foreshadowed. The theory of a primal promiscuity of intercourse does not accord with the implications of arboreal life, not to speak of anthropoid usage. The restrictions entailed upon childbearing by considerations of food and shelter fostered maternal care. There was correspondingly imposed an ever-increasing need for the physical and mental nurture which we call education.

Birth of Speech

The modification of the ape-like jaw proceeded side by side with the introduction of tools in connexion with food, and with the need for eating sparingly and often, due to the position of the abdomen upon a bipedal support. This made it possible for the organs connected with the mouth to utter articulate sounds. Under the guiding intelligence of the brain these came to possess a fixed communicable meaning, and so gave birth to speech, aided—not necessarily preceded—by gesture. The priceless gift of language was not only a social but also a mental endowment, because it furnished man with the means

of logical thought. The comparison of language-forms belongs to philology, which comes within the purview of ethnology in connexion with physical evidence of racial relationships. Language, however, is not in itself a criterion of race. Any babe may learn any language, and be ignorant of its parental speech. Language is not heritable.

USEFUL ARTS. When prehistoric archaeology reveals the oldest extant relics of man's handiwork it offers the first tangible evidence of cultural progress. The record is imperfect, because only those objects remain whose material has withstood the ravages of time. Man embarked upon his career as a tool-maker by employing for the fabrication of his implements not only wood and stone, but also bone and shell.

Discovery of Fire-Making

During the Stone Age, if not before, he acquired the power of producing fire, one of the mightiest events in his history. In that age, too, his inventiveness was displayed in such forms as the spear, the detachable harpoon, the poisoned arrow. He introduced personal adornment as a social no less than a magical device. In tropical lands clothing may have been, at first a contrivance for attaching to the person the tool equipment. The protective use of leaves and skins, out of which modesty arose, was also an early institution. When the forest was exchanged, as in palaeolithic Europe, for river valleys and open plains, the camp stations were but seasonal and transient. There is, however, pictorial evidence for the early invention both of the hut and of the tent.

DOMESTICATION. Towards the close of the older Stone Age some progress was made in turning to account the animal herds amid which man lived. This may have been at first the unforeseen and unintended result of the segregation of selected animals for religious purposes. The dog may have domesticated itself by living in companionship with man under conditions of mutual toleration and helpfulness. The taming of other animals for flesh, milk, and locomotion slowly followed. It was because this task was accomplished mainly in the Eurasian grasslands that their peoples were able to impose their wills upon the hunting communities of W. Europe.

The human family was now able to enter upon a settled existence, and permanent homesteads arose. Around these the women collected their household stuff and their stores of edible grasses and roots. Experience gradually showed that

the cereal and fruit supply could be ensured and increased by planting. The domestication of plants meant also the domestication of human life. It turned the hunter into a farmer, and for the first time man had leisure for reflection.

Many Inventions

A vigorous crop of inventions now sprang up, in an age that witnessed the adolescence of culture. The word culture itself denotes in Latin the tillage of the soil. The grinding of corn introduced the staff of life. The digging-stick, still used in Australia, became in tropical Africa the hoe, and in Europe the plough, which in its turn led to the wheeled cart. The use of natural objects (shells, nuts, gourds) for utensils was followed by the invention of basketry, which developed in two directions. From the plaiting of bark and rushes it advanced to weaving. The encasement of the basket in clay for cooking food was one of the contrivances that gave rise to pottery. Lastly, the discovery of the art of smelting and metal-working ushered in the modern world.

The practice of pasturage and agriculture brought in its train a new order of social ideas. It led to food-storage, the parent of capital. The tribal areas of the hunter (Australians, Eskimo) developed into communal, and that into private, property in land, the outcome of which was inheritance, individualism, and eventually kingship. Land cultivation, too, involved land measurement, the occupation of river valleys meant irrigation, and this demanded water engineering, while the rise of seafaring gave birth to navigation. Along these paths knowledge travelled to its ultimate goal in geometry, mechanics, and astronomy.

It is by such steps as these—animal- and plant-taming, the byre and the barn, inheritance, leisure, invention, ordered knowledge—with their wealth of meaning for the intellectual life, that the unfolding of culture is to be traced. Invention, the child of necessity, was the mother of civilization.

ARTS OF EXPRESSION. Reference has been made to the early place held in human society by personal ornament. The use of masks in palaeolithic dancing suggests a magico-religious origin. Out of the forms of art—dancing, music, drama, picture, ornament—devised for ceremonial uses, grew the arts of pleasure. Primitive music has not yet been adequately studied, but much attention has been given to the pictorial and decorative elements in the lower cultures.

The table illustrates the improvements of the weapons made in successive periods and the changing types of human beings, as these have been such, remains as have been discovered. The periods covered by this plan bring the story of man to the Azilian time, which is regarded as the Age was merging in the Neolithic Age—the age of polished stone weapons, of cromlech and stone circle builders and pile dwellers.

ANTHROPOLOGY **TABLE ILLUSTRATING CHARACTERISTICS OF THE EARLY EPOCHS IN THE GROWTH OF PREHISTORIC MAN**



Anthropology. Prehistoric man, as he is believed to have been from the evidence of the remains found at Galley Hill, near Northfleet, Kent

Drawing by A. Forester

When these arts were employed as a means of record and communication, they led to such inventions as picture-writing and such collateral devices as drum-language, wampum, and the quipu.

DISPERSAL OF CULTURE. To the ethnographer belongs the systematic description of the cultures of races and tribes one by one, and the collection and study of the objects and customs wherein their arts and institutions find expression. Analogies drawn from living savage peoples are of service in following out the unfolding of civilization. Nowhere, however, does man live to-day on the cultural horizon of palaeolithic Europe, unchanged and unchanging. The lowest races possess the same long ancestral history as ourselves. They have not developed to the same extent, or in the same way, because of the factors in life and environment that make for permanence rather than progress.

The modern savage may be primitive; he is not primeval.

Dissemination of Ideas

In this connexion the question arises, how far are human inventions of single or multiple origin? For this line of research their geographical distribution is an important guide. Constant as racial migration has been, cultural drift—the dissemination of ideas—has been equally potent. Even a single migrant may exercise profound cultural influence upon a distant people. It is in this direction that the anthropologist looks when seeking to explain such problems as the resemblances between the civilizations of Mexico and Peru and that of the Nile valley. While contact may thus lead to new outbursts of art and custom, prolonged isolation tends to stagnation and eventual decay.

SOCIAL INSTITUTIONS. Man is the child of his social no less than of his material environment. Even

in the food quest every act is governed by his obligations to tribal customs and his attitude towards the unseen. The primary social group is sometimes defined as a food-group. It is more than this, because of the factor of sex. The family—whether it developed early into some form of group-marriage or not—is the foundation of the tribe. Its implications may be followed under such related themes as Brotherhood, Caste, Consanguinity, Endogamy, Exogamy, Kinship, Phratry, Totem. The story is profoundly affected by the problems of mother-right and patriarchal rule.

History Illustrated in Weapons

These manifold institutions are traceable in action under such aspects as Betrothal Customs, Couvade, Marriage Customs and Wedding Rites. Light is thrown upon them also by Birth Customs, Naming Customs, Infanticide, and the group of usages pertaining to childhood and adolescence summarised under Circumcision, Mutilation Customs, Tattooing, Toys. These lead up to the higher education of savage life which is expressed in Initiation Customs. External relationships are implied in the developments of Cannibalism, Exophagy, Head-hunting, Scalping. The history of war is illustrated in weapons, and is closely bound up with the institution of slavery. The forms of customary law, modified by ceremonial law, developed into the law and justice of the civilized state. So, too, anthropology has its interest in, and makes its contribution to, the history of commerce and economics, medicine and surgery, politics and statecraft, ethics and moral science.

THE SUPERNATURAL. In the presence of death the emotional life finds itself brought most closely into contact with the supernatural. It is of profound significance that the oldest human interments attest the recognition of a life beyond the grave. On the material side this theme may be studied in such articles as Barrow, Cinerary Urns, Mummy, Pyramid, Stone Monuments. The institutions themselves are dealt with under Burial and Death Customs, Mourning Customs, Cremation, Urn-Burial, Funeral Rites.

The framework of all primitive culture is that belief in spiritual beings which is called animism, and—in association with animatism—is an explanation of nature no less than of the supernatural. This attitude of the primitive mind finds expression in such forms as Ancestor-, Nature-, Spirit-worship; Mana, Taboo; Fetishism,

Medicine-men, Shamanism ; Exorcism ; Human Sacrifice, Foundation Sacrifices ; and Magic.

In one direction these studies lead on to further developments such as Astrology ; Creation Legends, Deluge Legends, Folk-lore, Mythology. In the other they stand on the threshold of man's recognition of God enshrined in the world's great religions, and crowned by the supreme faith of Christendom.

NATIONAL RECOGNITION. Apart from its outstanding interest as the study that coordinates all human learning, anthropology is of immense importance in the practical life of the British Empire. There are chairs of social anthropology in Oxford and Liverpool, of ethnology in Cambridge and London. The Natural History Museum at South Kensington contains a small and inadequate department of physical anthropology. The British Museum possesses at Bloomsbury, besides its prehistoric collections, an ethnographical gallery which urgently needs expansion before the opportunity for its completion is irrevocably gone. The Hunterian Museum in the Royal College of Surgeons, London, was unfortunately two-thirds destroyed in the Second Great War.

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Anthropometry (Gr. *anthropos*, man ; *metron*, measure). Measurement of the human body. In modern research it is a branch of biometrics, which embraces the measurement of mental as well as physical characters. Measurements derived from every part of the bony skeleton are utilised by anatomists for comparison with similar data of the anthropoid apes in elucidating the physical evolution of mankind.

Anthropometric methods are employed by ethnologists for the comparison and classification of races. The principal instrument employed is called an anthropometer. Thus racial stature varies



Anti-Aircraft. Part of a battery of 4·5-inch A.A. guns which helped to defend London against enemy bombers in the Second Great War

from about 5 ft. 10½ ins. among the male Patagonians to 4 ft. 1 in. among the male Akka. Subordinate to this character is limb-length, and in some cases the stature of prehistoric man has been deduced from his fossil thigh-bones. Other measurable criteria are hair-colour, hair-texture, and skin-colour.

But the most important branch of this science is the measurement of the head and its organs, especially the skull. This includes: the relation of head-length to head breadth and the classification of races into long-heads, medium-heads, and short- or round-heads ; the projection of the upper jaw ; the shape of the nose ; eye-colour ; the form of the ear, the chin, the teeth. In regard to the capacity of the brain-cavity, it is now realized that large skulls are consistent with low mental development.

In 1883 the French government adopted Alphonse Bertillon's system of measurements for the identification of criminals. But

this "criminal anthropometry" has been generally abandoned in favour of the finger-print system. See Finger Print

Anthropomorphism (Greek, *anthropos*, man ; *morphē*, form). Term used for the ascription to God of a human form and qualities. Anthropomorphism represents a definite stage in the evolution of religion. In the earlier phases of religious thought, the gods were construed in terms of the natural world, and the great forces of nature, e.g. the sun, the moon, the winds, the rainstorm, etc., were deified. This worship is sometimes called the zoomorphic stage.

It was a great advance when, owing to the influence of Babylonia, Egypt, and especially Greece, the gods were humanised and interpreted in terms of man's personality. The gods of ancient Greece represent anthropomorphism in its most pronounced form. They are men and women "writ large" and endowed with human passions

and qualities on a grander scale. The Iliad of Homer may be described as the Bible of anthropomorphism. But though anthropomorphism is an intermediate stage in the development of religion, it is never its final goal. Even in Greece itself it was superseded by a far nobler conception of God, in the philosophy of Plato. It is not surprising, therefore, that we find anthropomorphic elements in the O.T., which speaks of God as sitting, standing, walking, seeing, hearing, and speaking, and alludes to His eyes, ears, and feet. Such statements must be regarded as a survival of a primitive type of faith, and we must not forget the great protests against anthropomorphism in Psalm 50 ("Thou thoughtest that I was altogether such an one as thyself") and Isaiah 40.

In its crudest forms anthropomorphism merits all the criticism which has been brought against it. "The lions," says Xenocrates, "if they could have pictured a God would have fashioned him like a lion, the horses like a horse, the oxen like an ox." "If a circle could think," writes Spinoza, "its God would take the form of a glorified circle." The case against anthropomorphism goes too far when Theodore Parker forbids us to say God "thinks" and Matthew Arnold will not allow us to hold that He either "thinks or loves." The dehumanisation of God in some forms of modern philosophy is, indeed, a recoil to the other extreme. There is a true as well as a false form of anthropomorphism. If man was created in the image of God, there must, necessarily, be points of contact and resemblance between the nature of God and the nature of man; and if this is granted, some form of anthropomorphism is inevitable. See God : Religion.

Anthrophophagi (Gr. *anthrōpos*, man; *phagein*, to eat). Tribes of man-eaters described by Pliny and others as dwelling N.E. of the Caspian. Of nomadic habit, they observed the custom of eating the flesh of aged parents. This honorific form of cannibalism, designed to preserve the ancestral soul from decay, survived in Eastern Asia until recent times.

Anti. Tribe of South American Indian forest dwellers E. of the Andes in S. Peru. They and the Chunchos are a warlike outpost of the Guiana Arawak. The Incas established them in Antisuyu. Of fine physique, they wear woven ponchos, are skilled in metal work, and practise simple agriculture.

ANTI-AIRCRAFT COMMAND, 1939-45

Gen. Sir Frederick Pile, G.C.B., D.S.O.

The G.O.C.-in-C. of Anti-Aircraft Command throughout the Second Great War here records the growth of his Command and the notable part it played in the defence of Great Britain. See also Air Defence; Balloon Defence; Barrage Balloon; Bofors Gun; Bren Gun; Flying Bomb, etc

Anti-Aircraft Command, a unit of the British army, was formed on April 1, 1939, and then consisted of five divisions. Lt.-Gen. A. Brooke, afterwards



Badge of the
A.A. Command

F.-M. Lord Alanbrooke, was appointed C.-in-C. At that date none of the divisions was up to strength, although, thanks to the Militia

Act, recruits were rapidly being enrolled. Two more divisions were in process of being formed. The seven divisions were scheduled to cover the defence of the whole of the United Kingdom, including Orkney and Shetland. In July, 1939, General Brooke handed over to General Pile, who remained G.O.C.-in-C. till the end of the war in Europe.

In the previous year, at the time of the Munich crisis (*q.v.*), the A.A. defences of the country, which then consisted of two divisions, went into action in preparation for the defence of London. At the time the Second Great War broke out, in Sept., 1939, the Command was equipped with 695 guns of all calibres and 2,700 searchlights. The guns were mostly of the old 3-in. type, equipped with Vickers predictor and No. 2 height-finder. The troops were Territorials—very keen men, but suffering from a very limited amount of training and shortage of equipment. The winter of 1939-40 was spent by both gun and searchlight crews in training. The searchlight crews, who were equipped with the 90-c.m. lamp and sound locator, were exercised nightly, but there was a shortage of aircraft for co-operation and a good deal of their work had to be make-believe. Serious air attacks on Great Britain were not made until July, 1940, when the Germans began their attempt to wear down the morale of the British people by sending over nightly about 70 planes directed against centres of industry. (See Air Raids).

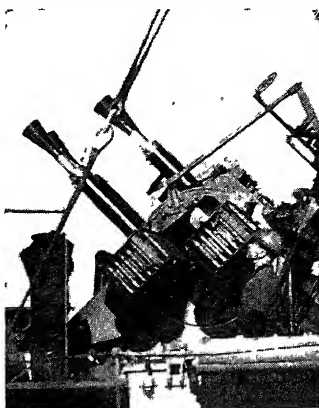
During Aug. and Sept., 1940, A.A. guns destroyed 253 enemy planes by day. The actual rounds per "bird" were somewhat fewer than the theoretical

figures which had been worked out by the scientists, so that it may fairly be assumed that the training had reached a high standard by this time.

After Sept. 7, when London was very heavily attacked both by day and by night, it became clear that the enemy's main attack was to be directed on the capital. At that time A.A. Command had approximately 1,000 guns and 3,000 searchlights deployed all over the country, London being defended by 92 heavy guns and 34 light guns. After Sept. 7 guns from all over Great Britain were hurried to London; and on Sept. 11 Londoners rejoiced to hear the tremendous barrage which greeted the German raiders. The technique of engaging the unseen target was still in its infancy. Radar equipment was not designed for such a purpose, and the shooting on that night of Sept. 11 can hardly be described as accurate; but it certainly had a deterrent effect on the enemy, as well as a most heartening effect on Londoners.



Anti-Aircraft. Bofors gun detachment at a position near London



Anti-Aircraft. Naval pom-pom, a multiple shell-firing machine-gun
Photo, British Official

During the winter of 1940-41 the night battles continued, at first directed on London and later on all the main centres in the country. New gunnery techniques were devised, and, as new radar equipment became available, shooting improved greatly. In the first six months of the night "blitz" over 80 p.c. of all planes destroyed at night were shot down by A.A. guns, fighters and balloons sharing the remainder between them.

The searchlights were still equipped with sound locators. As the enemy appreciated the danger from the night fighter and the searchlight, he flew higher and higher until it became almost impossible for a searchlight to illuminate the plane. All sorts of new equipment were devised for improving the accuracy of the searchlight. This equipment first of all depended on sound, but later used radar technique, and finally the searchlights became so accurate that it was difficult for any plane to fly through a searchlight belt without being picked up. Searchlights played a tremendously important part in the night defence of the country. At their peak nearly 7,000 were deployed, forming a carpet all over Great Britain, except for the mountainous regions. As man-power became more and more limited, the searchlights were reduced in numbers and eventually were deployed in two comparatively narrow belts—one in the S. of England and one running through the eastern counties. By this time, however, the heavy raids on England had ceased.

The man-power shortage also affected the guns, and led to the introduction first of women and later Home Guard in batteries.

Eventually there were 200 mixed batteries. The number of A.T.S. employed reached 74,000, and Home Guard 142,000.

Early in the war scientists were appointed to the Command H.Q. From small beginnings the numbers grew, until eventually the operation research group had representatives on almost every battery site, and a large staff continually dealt with the new problems arising from new enemy tactics and from the new equipment which was being rapidly produced. The success of the Command was perhaps more due to this band of scientists than to any one other factor.

Radar was gradually applied to the control of both heavy and light guns, as well as to that of searchlights, and achieved a high degree of accuracy. The guns themselves developed both in size and in velocity. The 3.7-in. gun was the main heavy A.A. armament during the war, but it was reinforced by a high velocity 3.7-in. and by 4.5-in. and 5.25-in. guns, while the light A.A. consisted of the 40-mm. Bofors and several types of 20-mm. gun. In addition, rocket batteries were deployed for defence of all the main cities to the number of over 1,000 twin rocket projectors.

The Germans' "tip and run" raids on S.E. coast towns were carried out at very low altitudes, and were thus difficult to stop, as radar was not designed to pick up low-flying aircraft. However, after some weeks of intensive effort, special radar was produced and the guns began to take heavy toll of the low-flying air-

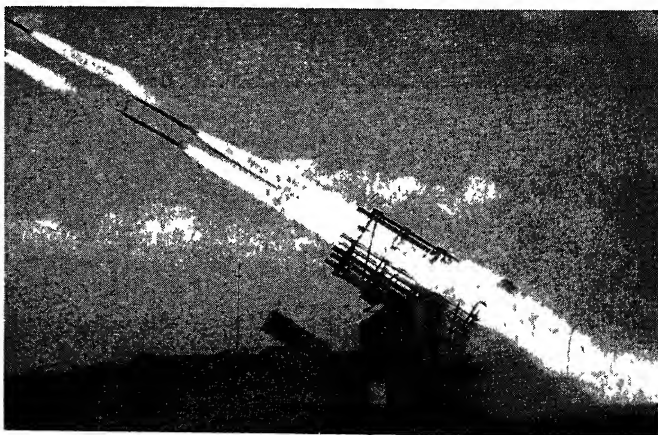
craft, eventually bringing that type of attack to a standstill.

The next phase of the German attack came with the advent of the flying bomb in June, 1944. Plans had already been prepared for deploying guns, balloons, and aircraft in three zones S.E. of London and S.E. of Bristol; but as the attack was only on London, the Bristol deployment was not proceeded with. It was soon evident that the deployment was not satisfactory. The gun zone and the fighter zone interfered with each other; neither arm had a fair chance of getting at the enemy. So it was decided to move the gun belt to the coast. The fighters patrolled out to sea, and were also ready to pounce on any flying bombs that passed through the gun zone. This new deployment at once began to give results, although much work had to be done and new equipment improvised before real success came.

Before the end of August the guns were shooting down regularly between 70 p.c. and 80 p.c. of all the flying bombs that entered their zone.

Over 1,500 A.A. guns of all sorts and nearly 500 rockets, together with 800 searchlights, had been specially deployed. The heavy guns were far the most successful in shooting down flying bombs, blowing up more than 50 p.c. in the air. These guns were all equipped with electric predictors and the very latest type of radar, and every possible manual operation was eliminated in favour of automatic control.

When the Pas-de-Calais area was overrun by Allied troops, there



Anti-Aircraft. Rockets being fired from a multiple-barrelled A.A. weapon on a mobile mounting. When the projectile is fired, its passage to the target is punctuated by a series of secondary explosions as the successive charges ignite

Photo, British Official. Crown copyright reserved

was a lull for a few weeks in the flying bomb attacks. However, in the autumn of 1944, flying bombs, now launched from aircraft, were once more directed against London. These bombs were launched off the E. coast, and once more a great deployment of guns took place, stretching all the way from Yarmouth to the mouth of the Thames. The success against these flying bombs was even greater than on the S. coast. On many occasions 100 p.c. of the targets were destroyed, and for days on end no single bomb of the many launched got through to London.

Before the end of the flying bomb attack the Germans started discharging rockets at London. Meetings were at once held at A.A. Command to explore possible ways of dealing with this new menace, and various schemes were suggested. Immense difficulties were met in attempting to predict the exact path of the rockets, but eventually specially devised radar situated on the E. coast was successful in locating a large proportion of them. However, the war ended before any theory could be finally put to the test.

Anti-Aircraft Ships. Introduced by the Royal Navy in 1935, when cruisers of the Curlew class were converted to provide floating A.A. batteries to accompany the Fleet at sea. The main armament of 6-in. guns was replaced by ten 4-in. semi-automatic A.A. guns each firing 15 rounds of H.E. shell per min.; four multiple machine-guns; and eight Lewis guns. The 4-in. guns were linked by a system of predictor fire-control. To provide protection for merchant convoys old destroyers were rearmoured with eight dual-purpose 4-in. guns, mounted in twin turrets, and a subsidiary armament of multiple pom-poms and machine-guns.

During the Second Great War the British Admiralty laid down new vessels specifically designed as A.A. ships. Displacing 1,200 tons, each ship had a speed of 20 knots and armament of eight dual-purpose 4.5-in. guns and a battery of multiple pom-poms and Orlicons. Other navies adopted the A.A. ship, but many, e.g. German *flak* ships, were converted trawlers restricted to coastal duties.

Anti-Aircraft Weapons. Passive anti-aircraft weapons comprise mines suspended from balloons, balloon barrages, and parachute and cable units. Active weapons comprise rockets and

heavy and light guns. In the Second Great War the three British types of heavy A.A. guns were the 4.5-in., the 3.7-in. and the 3-in. The 4.5-in. was mounted on a permanent concrete emplacement. Its range was 45,000 ft. and it fired nine 55-lb. shells per min. The 3.7-in. was a mobile gun, 10 tons, which could be sited quickly; with a range of 40,000 ft., it discharged twelve 30-lb. shells per min. The 3-in. A.A. gun, highly mobile, was a naval weapon converted to A.A. purposes. It fired 20 rounds per minute, to a range of 20,000 ft.

Light A.A. guns included the Bofors, Hispano, multiple Pom-pom, Orlikon, Vickers, Browning, Lewis, and Bren (*see* entries under all these headings; *also* Machine-gun). Such guns were usually sited individually in pits or on towers or buildings to form a defensive ring. A heavy A.A. gun site might have had eight 4.5-in. guns, spaced at intervals of a few yards, but the normal plan was a four-gun site run by a half-battery in two sections (two guns each). Passive weapons and light guns protected specific targets. Heavy A.A. guns kept up a barrage to hold attacking aircraft at altitude. *See* Ammunition; Rocket Weapons.

Anti-Atlas. Mountain plateau of S.W. Morocco. Its average elevation is about 10,000 ft. The Wadi Draa is parallel to the S. face, which drops abruptly to the Saharan lowland; the W. end is Cape Nun. The plateau is separated from the Great Atlas by a depression of which the sea end forms the shore of Agadir Bay.

Antibes. Seaport of France. In the department of Alpes-Maritimes, it is 13 m. by rly. S.W. of Nice, and was once a fortified town. Its chief industries are fishing and the making of perfumes from flowers specially cultivated in the neighbourhood. The ancient Antipolis, it is supposed to have been founded by Greeks from Marseilles in the 4th century B.C., and was later a Roman settlement. Under German control from Nov., 1942, it was liberated by U.S. troops Aug. 24, 1944. Pop. 23,574.

Antibiotic. Substance, produced by a living organism during growth, which has an inhibitory or lethal effect on micro-organisms. *See* Penicillin.

Antichlor. Name applied to the chemicals used to remove the last traces of chlorine from fibres or paper pulp bleached with chlorine obtained from chlorinated lime or bleaching powder.

and if even a small amount of free chlorine remains, the material will slowly rot. Sodium hyposulphite or "hypo" ($\text{Na}_2\text{S}_2\text{O}_3$) is most used as an antichlor, the fibres or pulp being immersed in the solution and afterwards washed. Antichlor has been rendered largely unnecessary by improved methods.

Antichrist (Gr. *anti*, against or in place of: *Christos*, Christ). Term used in the N.T. (1 John 2 and 4: and 2 John) to denote one who originally denies that Jesus is Christ and, teaching falsehood, claims to teach the truth. S. John, while speaking of several Antichrists, refers in especial to a single person, and assumes that the early Christians were aware that Antichrist should come. S. Paul had already (2 Thess. 2) spoken of the "man of sin" who should precede the day of the Lord, and this man of sin is identified with S. John's Antichrist. Allusion to the coming of Antichrist may also be found in the Gospels (Matt. 24; Mark 13; Luke 21). References in Revelation (11 and 13) to the beast are held by many commentators also to refer to Antichrist. (*See* Apocalyptic Number.)

The early Latin fathers and many later commentators decided that S. Paul held Antichrist to be the main obstacle to the setting up of Christ's Kingdom on earth; that S. Paul meant by Antichrist a particular Roman emperor—e.g. Caligula or Nero—is a later interpretation not found before the 17th century. At the Reformation the papacy, not the person of the pope, was identified with Antichrist by Luther, Calvin, and Zwingli, and also by Cranmer, Latimer, Ridley, and other Protestant apologists. As late as 1861 Lutherans maintained that the papacy became Antichrist A.D. 607, when Pope Boniface III was entitled Head of All the Churches. *See* Greek Testament Prolegomena to Thess., H. Alford, 1849-61; Discussions and Arguments on Various Subjects, chap. 2, J. H. Newman, 1872; Antichrist, W. Bousset Eng. trans., 1896; The Protestant Idea of Antichrist, in Essays Critical and Historical, J. H. Newman, repr. 1901.

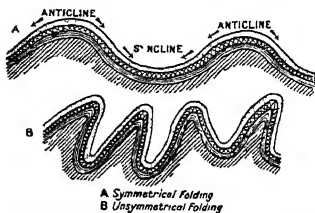
Anticipation (Lat. *ante*, before; *capere*, to take). English legal term. By the common law of England a married woman, called in Norman-French *feme covert*, could have no property apart from her husband. The Court of Chancery, however, allowed property of all sorts to be given to a trustee, to be paid and applied by him to a

married woman, or for her benefit, outside the husband's control. A common way of so benefiting a married woman is to give in trust the income of property for her life. In such a case the woman may, and often does, sell the income for a lump sum down, and if she squanders the lump sum she is left without means, thus defeating the intention of the person who gave her the income.

In the reign of George III, a remedy for this defect was devised. By this a marriage settlement was prepared, giving the wife the income of the trust fund for life *without power of anticipation*. Thus she could not mortgage or charge it in advance, or sell it or get rid of it in any way beforehand. A creditor could not levy execution on it. The device became generally adopted. By the Law Reform (Married Women and Tortfeasors) Act, 1935, it became impossible to impose this restraint on anticipation by any instrument executed after Jan., 1936, in so far as the instrument attached to the enjoyment of any property by a woman any restriction upon anticipation which could not have been attached to the enjoyment of that property by a man.

Anti-climax (Gr. *anti*, against; *climax*, ladder). Device in literary composition or rhetoric whereby emphasis of expression, conveying ever-increasing intensity, suddenly drops to an unexpectedly weak conclusion. For unintentional anti-climax see Bathos.

Anticline (Greek *anti*, against; *klinein*, to lean). Convex fold in stratified deposits, due to lateral



Anticline. Diagram illustrating the two forms

pressure on a portion of the earth's crust. The fold may be symmetrical or otherwise. If it has a cylindrical form it may be referred to a directional line known as its axis; if asymmetric, to a plane known as an axial plane. The rocks on each side and involved in the folding constitute the limbs of the fold. See Syncline.

Anti-Comintern Pact. Agreement directed against the Comintern, the Communist International

operating from Moscow. It was concluded Nov. 25, 1936, between Nazi Germany and Japan, and Italy joined it on Nov. 6, 1937. The original signatories undertook to inform each other of the activities of the Communist International, to consult each other on the necessary protective measures and to carry out such measures in close cooperation. Other countries "whose permanent peace was menaced by the seditious work of the Communist International" were invited to join; and in 1939 Manchukuo, Hungary, and Spain accepted the invitation. After the signing of the Nazi-Soviet agreement of Aug. 23, 1939, the pact was in abeyance, for its ideological basis had been removed, but after the German invasion of Russia, June 22, 1941, it was revived, and Nazi-dominated governments of Europe—Denmark, Finland, Slovakia, Croatia, Rumania, and Bulgaria—as well as the Japanese puppet government in Nanking, signified their adherence. See Axis; Comintern.

Anticosti. Island of Canada. Situated in the Gulf of St. Lawrence, it belongs to Quebec province, is 122 m. long by 30 m. broad, and has an area of 2,600 sq. m. The N. coast has limestone cliffs, the S. is low and dangerous. The island was acquired in 1895 by M. Menier, a Frenchman, who stocked it with wild animals.

Anticyclone. A meteorological term for type of pressure distribution in which the isobars form closed curves, as a rule roughly circular or oval in shape. Atmospheric pressure is highest at the centre and diminishes towards the margins, so that the movement of air is in a direction opposite to that in a cyclone. Towards the centre of the system the air is usually very still, but nearer the margins the winds—which are rarely more than light, since the pressure differences are not great, and therefore do not give such steep gradients as in cyclones—blow outwards in a clockwise direction in conformity with Buys-Ballot's law (*q.v.*). Anticyclones are generally regarded as bringers of fine or fair weather, and are marked as a rule by absence of rain, though in a land area surrounded by sea, *e.g.* the British Isles, drizzle is not uncommon, and appreciable rain may fall on and near the coasts. There are seasonal characteristics to be noted in British anticyclones: the almost cloudless type predominates in spring and summer, and

the overcast or foggy type in late autumn and winter.

In the first the diurnal range of temperature is considerable, while in the second it is usually small. In general the hot deserts are anticyclonic regions. In the N. hemisphere in summer an anticyclone centres near the Azores and intermittently spreads as far as S. England; in winter the Siberian anticyclone is accompanied by intense cold and the fringe of it sometimes reaches England. In the S. hemisphere anticyclones move steadily from W. to E. between the trade winds and the "brave west winds." See Meteorology; Weather.

Anticyra. Name of three towns in ancient Greece. One was in Thessaly on the Malian Gulf, another (mod. Aspra Spitia, white houses) was in Phocis, on the Corinthian Gulf. Both were famous for hellebore, supposed to be a remedy for lunacy and melancholia; hence a person suspected of insanity was told *Naviga Anticyram*, sail to Anticyra. The third Anticyra was in Locris.

Antietam. River of the U.S.A. It rises in the Allegheny Mts. in Pennsylvania, and flows S. through Maryland to the Potomac. It was the scene of a battle, Sept. 16-17, 1862, during the Civil War.

Antifreeze. Substance added to liquid to prevent its freezing. It is largely used in motor-car radiators to avoid damage by frost during winter months. Many substances have been suggested for this purpose, among the most satisfactory being alcohol, glycerin, and ethylene glycol. All these are miscible with water in all proportions, and the addition of any one of them to water considerably lowers its freezing point. The following figures show the percentage by volume of glycerin and ethylene glycol required to give protection from freezing at stated temperatures: *glycerin*, 32 p.c., +10° F.; 40 p.c., 0° F.; 47 p.c., -10° F.; 53 p.c., -20° F.; 57 p.c., -30° F.; *Ethylene glycol*, 25 p.c., +10° F.; 33 p.c., 0° F.; 39 p.c., -10° F.; 45 p.c., -20° F.; 50 p.c., -30° F.

Anti-friction Metals. Name given to various soft metals, usually alloys of copper, antimony, lead, etc., used for engine bearings, to lessen friction. If the bearings in which axles or shafts revolve are too hard, the shaft or axle may be worn away; if too soft, they may be squeezed out or torn by the revolving axle; if their surface in contact with the shaft is

unsuitable, excessive friction will be set up with consequent loss of power and excessive wear. Hence it is the aim of inventors and designers to provide a metal for bearings which, while not too hard, shall be hard enough to resist any pressure likely to fall upon it, and shall present a surface to the axle or shaft which will not tend to cling too closely to the latter, and shall hold the lubricant used rather than permit it to be squeezed out. Many such metals are now in use.

The first successful alloy of this class and the one most generally known is Babbitt metal (*q.v.*). Other such alloys include Parsons' Metal, Richards' White Metal, Delta White Metal, and Anti-Attrition Metal, while the class is also known by the term White Metal. One great advantage possessed by most of these alloys is that they admit of being poured while molten directly round the shaft or axle, thus saving much time and labour in machining.

Antigonē. In Greek legend, the daughter of Oedipus, king of Thebes. When her father, blinded by his own hand, had to leave Thebes, Antigone was his faithful companion until his death at Colonus. For her disobedience in burying the corpse of her brother Polyneices, which had been forbidden by Creon, king of Thebes, Antigone was immured in an underground cave, where she hanged herself. Antigone's tragic story is the subject of the Antigone of Sophocles, and she figures in plays by Aeschylus and Euripides.

Antigonus (c. 380-301 B.C.). General of Alexander the Great. On the death of Alexander in 323 the provinces of Greater Phrygia, Lycia, and Pamphylia were assigned to him, and after the death of Antipater in 319 he planned to make himself master of Asia. This led to a series of wars against the other generals of Alexander, and though by 306 Antigonus felt sufficiently sure of his position to assume the title of king of Asia, he was defeated and slain at the battle of Ipsus in Phrygia five years later.

Antigua. Island of the British W. Indies. It has an area of 108 sq. m. and is, with Barbuda and Redonda, one of the four presidencies of the Leeward Islands. It has a rugged and irregular coast, fertile soil, and several good anchorages, the best being English Harbour and St. John, the capital. It is an episcopal see and the seat of government of the Leeward Islands, and it produces salt,

cotton, pineapples, molasses, and rum. Discovered by Columbus in 1493, it was settled in 1632 by the British, by whom it was finally acquired in 1667. In 1940, a site near Parham Harbour was leased to the U.S.A. for 99 years for the construction of a U.S. naval base. Pop., with dependencies, 41,024.

Antigua. The former capital of Guatemala, 15 m. W.S.W. by road from Guatemala City. It stands at 5,000 ft. at the foot of three volcanoes rising to 13,000 ft. In 1773 almost every building but the cathedral was destroyed by an earthquake. Pop. 22,839.

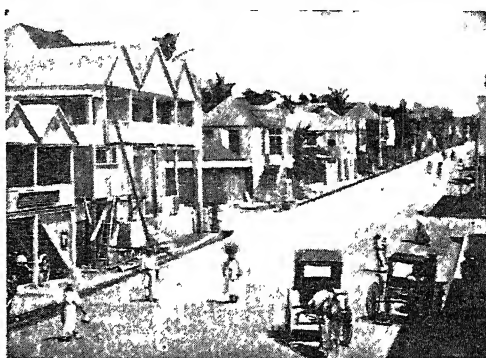
Anti-Jacobin, THE. Weekly newspaper, published for a few months in 1797-8. Its main object was to ridicule the democratic opinions of Fox and other Whigs. William Gifford was its editor, and its most brilliant contributor was George Canning.

Anti-Lebanon OR **ANTI-LIBANUS.** A mt. range of Syria. Lying E. of, and fairly parallel with, the Lebanon range, between Homs and Damascus, it is traversed by a branch rly. from the latter city to Beirut. The Anti-Lebanon extends about 90 m. and rises to a height of 9,166 ft. in Mt. Hermon.

Antilles. Name applied to the West Indies exclusive of the Bahama Islands. The Antilles are divided into two groups—Lesser and Greater—the former including Antigua, Barbados, Barbuda, Dominica, Grenada, Guadeloupe, Martinique, St. Lucia, St. Vincent, Tobago, and Trinidad, and the latter consisting of Cuba, Haiti and the Dominican Republic, Jamaica, Puerto Rico, and smaller islands. The Lesser Antilles are subdivided into the Leeward and Windward groups. *See* West Indies.

Antiochus. In Greek legend, son of the venerable Nestor. He accompanied his father to the siege of Troy, where he was killed by Memnon or by Hector.

Antilogarithm. In mathematics, the number which results when a base (usually 10) is raised to the power represented by a given logarithm. Thus, in the statement $10^{.30103} = 2$, .30103 is the logarithm of 2 and 2 is the antilogarithm of .30103. It is usual



Antigua, British West Indies. The main street of St. John, the capital of the island

not to calculate antilogarithms for oneself but to consult tables.

Antimony (symbol Sb, Latin *stibium*). Metal having a bluish-silvery colour and a flaky crystalline structure, showing beautiful facets on fracture. It is a chemical element. Atomic weight 121.76; specific gravity 6.72-6.86; and melting point 1,166° F. (630° C.). It volatilises at a white heat, but in a current of hydrogen distils readily. In a stream of oxygen or on ignited charcoal in air it burns with a brilliant white light, giving off copious fumes which settle in a fine dust (antimony trioxide), commonly described as "flowers of antimony." The metal does not rust or tarnish except slightly in air, but if exposed while in a state of fusion it quickly oxidises.

It dissolves in strong hydrochloric acid and in concentrated sulphuric acid. Nitric acid, even if very dilute, also dissolves it.

The extraction of the metal from its principal ores is simple, but usually involves several processes. Crude metal may be obtained in the first instance by a process of liquation, and the product refined in one of several ways into "regulus," which is the standard antimony of commerce. The old English method of obtaining the metal direct from stibnite consisted in smelting the ore with an alkaline flux (salt cake) and scrap iron in crucibles. When molten, the contents of the crucible were run into conical moulds which gave when cool an impure antimony, a regulus, and a slag of sulphide of iron. The process is still in use. The regulus so obtained, as also regulus prepared in other ways, is refined by heating in crucibles with soda, common salt, and a certain amount of pure antimonial ore. The iron, which is usually the chief impurity, and other foreign metals present are oxidised and scorified, the

resulting product being nearly pure antimony, containing 99.6 of the metal and known as "star" antimony from the fact that the surface of the ingots or slabs when cool are beautifully figured with stars.

The methods of extraction used in France, formerly the chief producer of antimony, and also where the ores contain appreciable quantities of arsenic, are more elaborate, and various furnaces are used.

The principal uses of antimony in the arts are in the preparation of alloys, particularly Britannia metal, type metal, pewter, and anti-friction metals. Its peculiar value in the making of type metal lies in the hardness which it imparts and the fact that it expands slightly on cooling and thus makes a very sharp and clearly defined cast. Its value for domestic articles lies in its hardness and its resistance to corrosion or tarnishing. Alloys, e.g. hard lead, are used in lead pipes, in the manufacture of shrapnel and shot, for battery plates, siphon taps, cable covering, and toys.

Antimony is widely distributed in nature, ores occurring in about 16 countries. China is the world's largest supplier, producing 17,000 tons in 1936. Other production figures for that year (in tons) were: U.S.A., 9,000; Mexico, 7,000; Bolivia, 6,000; Yugoslavia, 2,000; Czechoslovakia, 1,000; Algeria, 1,000; Peru, 1,000.

Antimony Compounds. Three oxides of antimony, the trioxide (Sb_2O_3), the tetroxide (Sb_2O_4), and the pentoxide (Sb_2O_5), are known. Antimony trioxide is found native, but is usually prepared by boiling powdered antimony sulphide with hydrochloric and nitric acids until free from sulphuretted hydrogen, pouring the liquid into a large volume of water, and washing the precipitate until it is free from acid. From it is prepared tartar emetic, used in medicine and as a mordant in dyeing and calico printing. The two chlorides of antimony are the trichloride (SbCl_3) and the pentachloride (SbCl_5).

Antimony trichloride is prepared by dissolving the sulphide in strong hydrochloric acid and evaporating the liquid to dryness. The pasty mass obtained is known as butter of antimony, a name first applied to it by Basil Valentine. In concentrated solution, butter of antimony is used in veterinary medicine as a caustic, and also for browning rifle barrels. When this solution of antimony trichloride is poured into water, a white precipitate of basic chloride is obtained, which as Powder of Algaroth was much employed in medicine towards the

end of the 16th century by a Veronese physician named Algarothus. Of the two sulphides of antimony, antimony trisulphide (Sb_2S_3) is found in nature as antimony ore, and somewhat resembles graphite in physical properties. As kohl, this native form has been used in the East from time immemorial for colouring the eyebrows and skin. It can also be prepared as a red powder by passing sulphuretted hydrogen into a solution of an antimony salt. This form is for vulcanising rubber, in making fireworks, and as an ingredient in match-head composition.

Kermes mineral or Carthusian powder, formerly of high repute as a febrifuge, is, from its method of preparation, a mixture of antimony trisulphide and trioxide. Antimony cinnabar, used in painting, is an oxisulphide. Schlippe's salt, employed in photography, is made by warming antimony trisulphide with a strong solution of sodium sulphide. Antimony pentasulphide (Sb_2S_5) or golden sulphide of antimony, made by boiling the trisulphide with sulphur and caustic potash, filtering, and precipitating with an acid, was formerly a favourite medicine. The organic compounds of antimony are of considerable importance in medicine as anthelmintics and in the treatment of acute diseases. The symptoms of acute and chronic antimony poisoning are similar to those caused by arsenic.

Antimony Ores. The chief ore of antimony is stibnite or antimonite, which is a sulphide of the metal. It also occurs in numerous associations with other metals—arsenic, lead, copper, iron, nickel, silver, and zinc. Stibnite is lead grey in colour, builds blade-like crystals, occurs in veins deposited from alkaline solutions, and is usually associated with quartz. It is found in China, Japan, Bohemia, Mexico, Corsica, America, and to a limited extent in Cornwall. The First Great War, by increasing demand and cutting off Continental supplies, stimulated production in other regions, and the metal is now being worked in California, Nevada, Alaska, Mexico, Bolivia, Algeria, France, Italy, Spain, Canada, Germany, Hungary, and the Transvaal.

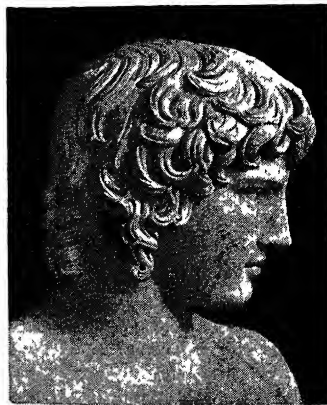
Antinomianism (Gr. *anti*, in place of; *nomos* law). Term first employed by Luther against Johannes Agricola, to express the doctrine that Christians being saved by faith alone are bound by no obligation to keep the law of God. An exaggerated view of S. Paul's teaching on justification by faith (Romans), and a reaction

from Judaism, the tendency to antinomianism is found in early Gnostic sects and in later mystics. It was fiercely maintained in Germany in the 16th century, and as fiercely opposed by Luther, and was rife in England at the time of the Commonwealth.

The controversy was concerned with belief only, without reference to conduct, but from time to time, and especially in the case of the Anabaptists, antinomianism was pleaded in extenuation of the grosser excesses, the argument being that since man is saved by his mental attitude, i.e. by his acceptance of the atonement of Christ, it is irrelevant what is done by the body. The doctrine was formally condemned by the Council of Trent, by Luther, and by the leading divines of the Church of England and Nonconformity. Its vitality is still seen in numerous societies formed to concentrate on thought and ignore rules of conduct and the external practices of religion. The real antithesis of antinomianism is formalism, which, again ignoring conduct, would practically confine Christianity to the observances of ecclesiastical laws. See Anabaptists.

Antinomy (Gr. *anti*, against; *nomos*, law). Kant's term for a system of two contradictory propositions, each to all appearances equally valid. Thus, either of the propositions, "the world has a beginning in time and is limited as to space," "the world has neither beginning nor limits," can be equally defended. See Logic.

Antinous (d. A.D. 132). Favourite of the Roman emperor Hadrian. He was born at Claudiopolis, in Bithynia, and drowned himself in the Nile at Bessa. To signify his grief and perpetuate his memory, Hadrian enrolled Antinous among



Antinous, favourite of the Roman emperor Hadrian

Vatican, Rome

the gods, built temples and erected statues in his honour, of which a bust in the Vatican and a statue in the Capitoline museum are examples. Antinous also appears on coins and gems, and his name was given to a constellation.

Antioch or **ANTAKYA**. Town of Turkey, in the vilayet of Hatay. It is on the left bank of the Orontes, about 60 m. W. of Aleppo. Founded by Seleucus Nicator in 300 B.C. in memory of his father Antiochus, for a time it rivalled Rome in greatness. Called Antioch the Beautiful, it lay in a fertile plain 14 m. from the sea, and at its zenith had a population of 500,000. It played a leading part in the early days of

Antiochus. Name borne by thirteen Macedonian kings of Syria of the house of the Seleucidae (*q.v.*). Nearly every king of the dynasty was named either Antiochus or Seleucus.

Antiope. In Greek mythology, mother by Zeus of the twins Amphion and Zethus. She afterwards married Lycus, king of Thebes, but the machinations of Dirce, his former wife, set her husband against her, and Antiope was cruelly treated. When her sons reached manhood and learned of the persecution of their mother, they killed Lycus and Dirce.

Antioquia. Department of Colombia. It contains branches of the Cordilleras and is watered by the Cauca Magdalena and other

are anti-parallel to A B and A C when the angle A C B equals the angle A X Y. See Geometry.

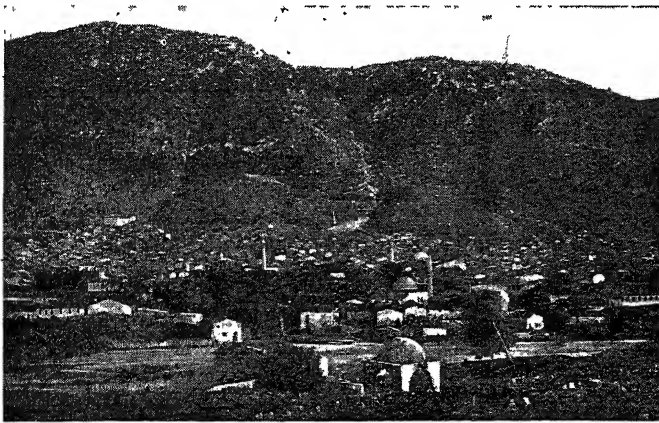
Antiparos or **OILAROS**. Island in the Aegean Sea, one of the Cyclades. It is near Paros, hence the name, is 8 m. long by about 3 m. broad, and has a famous stalactite cavern.

Antipater (d. 319 B.C.). General of Philip of Macedon and of Alexander the Great. When the latter embarked on his Persian campaigns he left Antipater behind as regent, in which capacity he put down a Spartan revolt at Megalopolis in 331. After Alexander's death he shared the government of Macedonia with his son-in-law Craterus, but the change inspired the Greeks with the hope of regaining their freedom. For a time Antipater was hard pressed, but eventually he decisively defeated the combined Greek forces at Crannon (322). After the murder of Perdiccas (321), he was declared regent of the empire at Tripuradeisus in Syria. He died in Macedonia.

Antipathy (Gr. *anti*, against; *patos*, feeling). The opposite of sympathy, an instinctive, unreasoning aversion to persons or things, physical or psychological. In the first case it is natural, depending upon the peculiar structure of our senses; in the second it is acquired, in most cases the result of the association of ideas. Certain persons cannot endure the smell of certain flowers; Erasmus became ill if he smelt fish. Many women and even men are alarmed at the sight of a mouse; Lord Roberts had a great aversion to cats. The dog has a natural antipathy to the wolf and the cat, the bull and the turkey to the colour red.

Antiphilus. A Greek painter. Born in Egypt, he flourished about 330 B.C. Crossing to Macedonia, he lived at the capital, Pella, and is said to have painted the portraits of Philip and Alexander the Great. He later returned to Egypt, where he enjoyed the favour of Ptolemy I. He was jealous of his rival Apelles, against whom he made a discreditable accusation. Ptolemy, having discovered that the charge was false, is said to have presented Apelles with 100 talents (£20,000) and to have given him Antiphilus as a slave.

Antiphon (480-411 B.C.). One of the ten Attic orators. Born at Rhamnus in Attica, he conducted a school of rhetoric which Thucydides the historian is said to have attended. Of his fifteen extant speeches the majority were composed as models for pupils, the remainder for use by clients



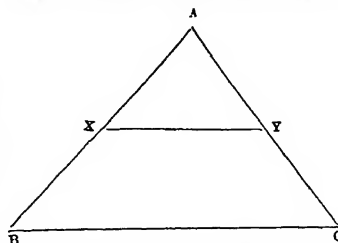
Antioch, Turkey, on the Orontes, about sixty miles west of Aleppo. Known as Antioch the Beautiful, it once rivalled Rome in its greatness

Christianity, and here the followers of Christ were first called Christians (Acts xi, 26). Its bishops were patriarchs of the first rank, and for long it was the centre of missionary enterprise. Captured and destroyed by the Persians in A.D. 538, it was rebuilt by Justinian, and conquered by the Saracens c. 638, from which time its decline dated. It prospered again under the Christians from 1098 to 1268, when it was taken by the Egyptian Bibars and gradually decayed. The modern town is a place of slight importance, trading in grain, silk, tobacco, and cotton. French Syria ceded it to Turkey by treaty, June 23, 1939. Pop. 28,000.

Antioch. Ancient city of Pisidia. Founded, like Antioch in Syria, by Seleucus Nicator in memory of his father Antiochus, it was a free city under the Romans. It was colonised under Augustus and received the name of Caesarea. The place, which was visited by S. Paul, is mentioned in Acts 13 and 14. Its site is about 200 m. E. of Izmir.

streams; its area is 25,419 sq. m. To the N. it extends to the Gulf of Darien. The mts. are forest-clad and rich in gold, silver, platinum, iron, coal, galena, and rock salt. The agricultural produce includes rubber, maize, coffee, timber, cotton, sugar-cane, and tobacco. The capital is Medellin.

Anti-parallel. Term used in geometry. It denotes the figures created when lines cross others in such a way as to produce equal angles in a figure, but on contrary sides to what would have been the case had the crossed lines been

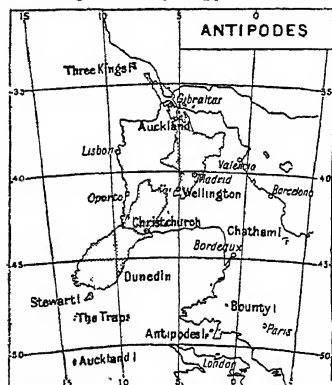


parallel. Thus in the figure A X B C Y the lines X Y and B C

in the law courts. Antiphon enjoyed a great reputation as orator, but his only known public speech is his own defence when arraigned after the fall of The Four Hundred. Despite his eloquence, he was condemned and executed. *Consult* Attic Orators, R. C. Jebb. 1876.

Antiphonal (Gr. *anti*, opposite; *phōnē*, voice). Music in which effects of response are used. Officiant and choir, soloists and choir, or a divided choir, may be employed with this object. Antiphonal singing is heard in the chanting of the Psalms in the Roman Catholic and Anglican Churches, where alternate verses or half-verses are allotted to opposite sides of the choir.

Antipodes (Gr. *anti*, against; *podes*, feet). Geographical term meaning directly opposite each



Antipodes. Map indicating the antipodal relation of London and W. Europe to New Zealand

other. Points are antipodal to each other when they are at opposite ends of a straight line joining the points and also passing through the centre of the earth. Thus one point is as far N. of the equator as the other is S., while each is separated from the other by 180° of longitude. Although the longitude of New Zealand is roughly that of a land antipodal to the British Isles, the S. of Britain is some 1,100 m. farther from the equator than the N. of New Zealand.

Antipodes Islands. Group of uninhabited rocky isles in the S. Pacific. They belong to, and are about 480 m. S.E. of, New Zealand.

Antipope. Pope set up in opposition to the canonically elected pontiff. The Roman Catholic Church recognizes an unbroken series of true popes; any opposition popes for whom that title is claimed are accounted antipopes.

Felix, in the 4th century, is often wrongly called the first anti-

pope. He was intruded during the exile of Liberius, but was canonised as a saint. The last was Felix V, Amadeus of Savoy, who was elected by the Council of Basel in the 15th century, in opposition to Eugenius IV. On the death of Eugenius Nicholas V was elected, and during his pontificate Felix resigned his claim. The Great Schism began in 1378 with the election of the antipope Clement VII in opposition to Urban VI. Clement's successor bore the name of Benedict XIII. In 1409 the Council of Pisa declared the deposition of both Benedict and the opposition pope Gregory XII, but neither would resign, and after a short interval John XXIII was appointed. The contest between the three popes was settled at the Council of Constance, which elected Martin V in 1417. *See* Papacy.

Antipyrin. Antipyretic and analgesic drug introduced into medicine in 1884. A white crystalline powder, chemically a phenylpyrazolone derivative, it is also known as phenazone.

Antiquaries, SOCIETY OF. An English learned society. It was reconstituted in 1717, in succession to an earlier association (1572-1604), and granted a royal charter in 1751. It ranks in age and dignity next to the Royal Society, and its president is an official trustee of the British Museum. The offices are at Burlington House, London, W. Its library is rich in examples of early printing, heraldry, pageantry, and numismatics, and is available for fellows (F.S.A.). Its publications are *Archaeologia*, since 1770; and *Proceedings*, since 1849.

Antiquaries, SOCIETY OF. A Scottish learned society, founded in Edinburgh in 1780. The fellows at once began the formation of a museum, primarily to illustrate Scottish history. In 1856 this was presented to the public, and has been since maintained as the National Museum of Antiquities of Scotland. The fellows are described as F.S.A.Scot.

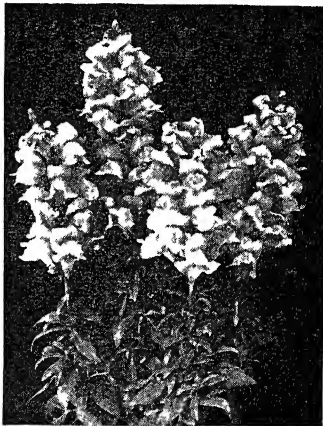
Antiquary, THE. Third of the Waverley Novels and Scott's own favourite. It was published in May, 1816. "There is assuredly," writes Lockhart, "no one of all Scott's works on which more of his own early associations have left their image." The book gives a picture of life in Forfarshire (Angus) in the last decade of the 18th century, and is notable for some of the most effective of Scott's creations—Jonathan Oldbuck, the bachelor antiquary; Edie Ochiltree, the garrulous but shrewd old gaberlunzie man; the

gloomy Glenallans, the tragic Mucklebackits, and others.

Antique. Term used in art schools for what was once the students' earliest introduction to figure work. Drawing from the antique implied the making of accurate and painstakingly finished studies from the plaster cast of some famous piece of Greek sculpture, e.g. the Discobolus, the Belvedere Torso, the Ilissus, the Venus of Milo. The practice has been virtually abandoned in favour of drawing from the living model.

The word is also used for a piece of furniture or an objet d'art of which the chief value and interest lie in its age.

Antirrhinum OR SNAPDRAGON. *Antirrhinum majus* is a perennial herb of the family Scrophulariaceae, a native of Europe. The variable leaves are more or less lance-shaped. The tubular flowers are purplish-red and closed by the compression of the rounded upper lip. Garden antirrhinums are cultivated forms, and white, yellow, crimson, or variegated



Antirrhinum. Fine blooms of the variety known as Royal Rose

in colour. The only native British species, *A. orontium*, is found mainly in cornfields.

Antisana. Volcanic peak of the Andes in Ecuador. It is 35 m. S.E. of Quito, and is 19,335 ft. high. On its slopes is one of the highest inhabited villages in the world, Tambo de Antisana, 12,400 ft. high. The volcano is extinct.

Anti-Semitism. Modern term for that open hostility to the Jews which has existed in varying degree in every country where they have been found since the 4th century A.D. The word Semite is commonly regarded in Europe as equivalent to Jew, the only Semitic

people who have found a permanent home in Europe being the Jews. While the question of religion had some relation to the hostility to the Jew in the earlier Middle Ages, the basis of anti-semitism has been in the main economic and social; in its modern form it is political, economic, and, most of all, racial.

The argument of the anti-semiter is that the Jew, being always of alien race, cannot be absorbed into national life, and that, since he naturally puts the welfare of his own race before that of the country of his adoption, he should be excluded from all share in the government of that country. The answer of the Jew to this contention is that he has always proved himself a loyal, law-abiding, and industrious citizen in whatever land he has settled, and that the international character of his community does not conflict with national duty. Anti-semitic outbreaks in Eastern Europe were largely the result of the indebtedness of the people to the Jewish moneylenders, the latter having acquired a hold on the land of the peasants as security for loans.

As an organized political movement anti-semitism dates from the latter half of the 19th century. In Germany, France, Austria, and Holland it was directed to excluding the Jew from political rights. In Russia, Rumania, and Poland it was displayed in violent attacks upon his person and property. In 1873, during a time of German financial crisis, a Hamburg journalist, Wilhelm Marr, published a pamphlet called *The Victory of Judaism Over Germanism*, which became the basis of an organized anti-semitic movement, attracting a considerable strength of clerical and conservative support. It died down some years later after certain scandals in which the leaders were involved. Many potential supporters were also horrified by events in Russia, where extensive savage pogroms took place in 1881, hundreds of Jews being robbed and murdered. Almost simultaneously anti-

semitic outbreaks occurred in Austria and Hungary. In France the movement reached its height in the trial and conviction of Alfred Dreyfus (*q.v.*).

After the Russian revolution of 1917 many people professed to see in the new Bolshevik government a Jewish conspiracy to overthrow Christian civilization. The work, *Protocols of the Leaders of Zion*, purported to be the minutes of a



Anti-semitism. Jewish husband and wife wearing the yellow Star of Judah which was enforced in Germany in the Second Great War

secret conference of leading Jews at which a plan of world domination was drawn up. This was exposed as a forgery in 1921, but Nazi Germans later accepted its authenticity as justification for their own crimes.

Anti-semitism had returned to Europe with renewed violence on the rise of Hitler to power in 1933. Hitler was a lifelong Jew-hater, suspecting and fearing Jewish influence everywhere. Under his regime Jews in Germany, of every walk of life, were penalised as a non-Aryan race by the so-called Nuremberg laws. They were deprived of the protection of the law; their means of livelihood were removed; their property was confiscated; they were sent to concentration camps, hunted into exile, or murdered. In Streicher's paper, *Der Stürmer*, they were constantly assailed with brutal indecency. Hitler admitted many times that he aimed at the physical extermination of the Jewish race.

The Second Great War gave him every chance for further repressive measures. Jews in Germany were denied ration cards; they were excluded from all means of public transport and centres of public recreation. They were obliged to wear a yellow badge as a mark of recognition. Jews were forcibly

removed from central and western Europe to eastern Europe, where they were crowded into ghettos. The same measures were applied in countries in Nazi occupation or under Nazi influence. In Poland, particularly, Jews were massacred wholesale. In April, 1943, about 40,000 Jews in the Warsaw ghetto resisted a German attack. Thousands were killed and the survivors were deported to an unknown fate. Hundreds of thousands of Jews were exported as slaves from France with the tacit consent of Pétain and Laval.

It has been computed that upward of 5,000,000 Jews were exterminated by the Nazis, in crematoriums and asphyxiation halls, by machine-gunning, clubbing, and mass drownings. At Maidanek, in Poland, 18,000 were killed in a single day, Nov. 3, 1943, to the music of brass bands.

In Poland anti-semitism has always been present to some degree, and even after the Second Great War the Jews were subjected to persecution; though they enjoyed equal rights of citizenship and the government was doing its utmost to eradicate anti-semitism. In the Balkans, Nazi propaganda in Rumania caused a smouldering anti-semitic feeling to burst into flame. There were murders, riots, and the same kind of anti-Jewish legislation as the Nazis had introduced elsewhere.

Neither in Great Britain nor in the U.S.A. has anti-semitism obtained any considerable influence, though the British fascists led by Sir Oswald Mosley in the years immediately before the Second Great War made attacks on Jews in the poorer quarters of London and other cities. *See also* Jews.

Antiseptics (Gr. *anti*, against; *septikos*, putrefying). Substances which destroy bacteria or arrest their growth. Pasteur proved that putrefaction and fermentation are always due to bacteria or related micro-organisms, as are also those diseases termed infectious. When antiseptic agencies actually kill the bacteria, sterilisation or bactericidal action is said to occur. Antiseptic properties are exhibited in a variety of ways, *e.g.* the inhibitory effect exerted on many bacteria by the fluid constituents of the blood, to which in part must be ascribed the resistance to infection manifested by the living body. Many chemicals such as strong acids or alkalis, *e.g.* quicklime, kill bacteria; and concentrated salt solution has the property of

preventing bacterial growth, hence its use in pickling meat, etc. The term antiseptic, however, is usually restricted to definite chemical compounds which act in high dilutions. Among physical agencies heat and certain radiations are very effective, *e.g.* light rays, especially in the ultra-violet region of the spectrum. Antiseptics produce physical or chemical changes in the organisms which are incompatible with their life-processes, but the exact mechanism of these effects is still obscure. To obtain efficient action the antiseptic must have access to the bacteria in a watery medium; thus organisms encased in oily matter are protected, unless the antiseptic can form emulsions with fats, hence the value of detergent preparations. Also, the antiseptic must be used in adequate concentration and must remain in contact with the bacteria for a sufficient time. Again, organic matter if present must be allowed for; since it combines with most antiseptics, a greater amount of the latter will be required.

Relative Lethal Properties

Antiseptics differ widely in their potency as measured by the dilution in which they are effective, and also as regards the rate at which they kill bacteria. Thus carbolic acid, Lister's original antiseptic, is comparatively weak, and it is necessary to use $\frac{2}{3}$ or 5 p.c. solutions; mercuric chloride under similar conditions is employed in a strength of 1 in 1,000 or 1 in 2,000. These substances kill organisms rapidly, whereas some extremely powerful antiseptics, *e.g.* proflavine and other aminoacridines, act relatively slowly, *i.e.* are at first only inhibitory (bacteriostatic) and finally lethal. All organisms are not equally susceptible to a given antiseptic. Solutions of hypochlorites (bleaching powder) are exceedingly rapid, powerful bactericides when other organic matter is absent, hence their use for rendering supplies of drinking water safe.

It is of practical importance that heat, particularly when moist, is highly destructive, momentary exposure to boiling water killing the majority of bacteria, *e.g.* tubercle bacilli. When sterilising a fluid, however, care must be taken that the whole material actually reaches the lethal temperature. When dry, many organisms will withstand brief exposure to temperatures over 100°C .; on the other hand, in the

absence of moisture bacterial multiplication is inhibited, and some bacteria are killed by ordinary conditions of drying. The process of pasteurising depends on the fact that exposure of aqueous fluids, *e.g.* milk, to lower temperatures— 162°F . for at least 15 seconds or 145°F . for 30 minutes—kills any pathogenic bacteria which may be present and also greatly increases keeping properties by destroying most of the organisms which cause souring and putrefaction. Beer and light wines can be treated similarly. The process of "canning" of foodstuffs depends on sterilisation at higher temperatures, with exclusion of air from the containers. Certain species of bacteria can produce resistant forms, known as spores, which require prolonged boiling for their destruction, *e.g.* at least 5 to 10 minutes for the spores of anthrax, tetanus, and gas gangrene bacilli, or many hours in the case of certain others, such as the hay bacillus. Spores are also resistant to chemical antiseptics; but are killed rapidly by moist steam under pressure, *e.g.* in less than 30 minutes at 115°C . Temperatures at or below 32°F . inhibit the multiplication of bacteria, hence the method of preserving meat and other food by chilling; but cold is not lethal, organisms being found to survive exposure even to liquid hydrogen.

Varieties and Specific Uses

The general employment of antiseptics in surgery dates from the discovery by Lord Lister that Pasteur's work on putrefaction applies also to sepsis in wounds, *i.e.* a wound will heal without the occurrence of suppuration provided that it is not contaminated with virulent bacteria. By ensuring that the patient's skin is properly cleansed and that everything which comes into contact with the site of operation has been sterilised, a surgical wound will usually heal aseptically. Virulent organisms may be conveyed by the air in contaminated dust, but this is not usually an important source of wound infections. The applicability of different antiseptics depends on the particular purpose for which they are to be employed. For sterilising surgical dressings, and infected materials, moist steam, phenolic compounds, mercuric chloride, or hypochlorites are widely used, and for surgical cat-gut watery solution of iodine or hydrogen peroxide. For application to the skin

alcohol (70 p.c. of absolute) and alcoholic solutions of certain organic dyes (brilliant green, crystal violet, and aminoacridines) are suitable. For disinfection of the air in rooms, wards, etc., the following are recommended—ultra-violet radiation, propylene glycol as vapour, or a fine spray (aerosol) of hypochlorite solution.

Science of Chemotherapy

An entirely different problem is the attempt to destroy micro-organisms in an infected body without damaging the living tissues in which they are embedded. This branch of treatment is called chemotherapy. It presents greater difficulties than that of sterilising dead materials. Most antiseptics are comparatively ineffective or actually harmful in the living body, because they combine with the tissues and body-fluids, and so are neutralised before reaching the organisms and also because they are active tissue-poisons, like phenol or mercuric chloride. Thus for introduction into infected wounds where a local action on bacteria is desired, *i.e.* surface antiseptic effect, useful substances are those which are relatively non-poisonous, and which are not inactivated by blood serum, *e.g.* the aminoacridines (proflavine, monacrine, etc.), sulphonamides, and penicillin, or a mixture of these. Neutral hypochlorite solutions (eusol, Dakin's solution) and the chloramines have the property of becoming transformed into harmless compounds in the tissues, so that they can safely be frequently renewed. It is still more difficult to act on bacteria in the blood stream or to reach infected sites in the tissues by systematic administration of drugs. When administered in this way the sulphonamides and penicillin are effective against many pathogenic bacteria including those usually responsible for septic infections. In the case of chemotherapeutic agents it is probable that the destruction of the micro-organisms in the body is usually due to the cooperated action of the drug with the defensive mechanisms of the living tissues.

C. K. Browning, M.D., F.R.S.

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Anti-Slavery Movement. Agitation and organization to abolish slavery. It was conducted in two distinct stages—(1) the stopping

of the slave trade, and (2) the abolition of slavery itself.

In 1772 a legal decision was given that a slave could not be owned while in England. An Act stopping the English slave trade was passed March 25, 1807, and the imposition of heavy penalties on offenders in 1811 finally suppressed it. Denmark had abolished the trade in 1792. The U.S.A. in 1794 prohibited trade in slaves with foreign countries, and in 1807 stopped all importation of slaves. The attack on the trade had been led in England by Thomas Clarkson, William Wilberforce, and Zachary Macaulay. The Emancipation Act, passed by the British Parliament Aug. 7, 1833, was a measure that came gradually into operation so as to release all slaves in the British Empire by 1840. The end, however, arrived two years earlier through the voluntary release of the slaves, who had proved intractable during the transition period.

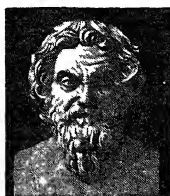
Slavery was extinguished in the French colonies in 1848, by Holland in 1863, and in the U.S.A. in Dec., 1865, following the Civil War. The northern states of the Republic had emancipated their slaves, for whose services there was no demand, during the period of the English agitation before 1840, but many were sold into the southern states, where the cotton industry required much cheap labour. Seeing their economic prosperity threatened by the anti-slavery movement, the southern states claimed the right to secede. See Slavery; Slave Trade; consult also History of the Abolition of the African Slave Trade, T. Clarkson, 1808; History of Slavery and Serfdom, J. K. Ingram, 1895; Slavery, Lady Simon, 1929.

Anti-Slavery Society, BRITISH AND FOREIGN. Society founded in 1839, soon after the abolition of slavery in the British Empire. Its objects were described as the universal extinction of slavery and the slave trade, and the protection of freed slaves in British possessions. It watches native conditions in the British Colonies: strives to improve those in lands for which Great Britain has treaty obligations, such as the Belgian Congo, and also in places, such as the Putumayo region, where British capital is employed; and cooperates with societies in other civilized lands which have similar objects. It has a parliamentary committee and publishes a quarterly journal, The Anti-Slavery Reporter and Aborigines'

Friend. In 1909 the society was amalgamated with the Aborigines Protection Society under the name of the Anti-Slavery and Aborigines Protection Society. The offices are at 49, Denison House, Vauxhall Bridge Road, London, S.W.

Antispast (Greek *antispasēn*, to draw in the opposite direction). In prosody, a four-syllabled foot consisting of an iambus and a trochee, $\sim - \sim -$, i.e. a short and a long syllable followed by a long and a short syllable.

Antisthenes (c. 440-370 B.C.). Founder of the Cynic school of



Antisthenes,
Greek philosopher

Greek philosophy. Born at Athens, originally a pupil of the rhetorician Gorgias, he became a follower of Socrates, after whose death (399) he founded a school in the Cynosarges gymnasium. He chiefly devoted himself to the ethical side of his master's teaching, and held that virtue consisted in doing without all but the barest necessities of life and in the avoidance of evil; that the man who wanted little was most like the gods who wanted nothing. He conscientiously practised what he preached, but the doctrines and manner of life of the extremists among his followers degenerated into absurdity.

Antistrophe (Gr. *antistrephein*, to turn to the opposite side). In Greek chorus and dance, that part of an ode which was sung as the chorus returned from left to right after singing the strophe as they moved from right to left. It is also the stanza of a choral song which alternates with the strophe; and, in rhetoric, the figure of retortion, or turning back of a sentence to a word or idea previously employed in it.

Anti-Tank Weapons. For a description and discussion of the various methods of defence employed against tanks—e.g. anti-tank gun and rifle, P.I.A.T. projector, "sticky bomb"—see under Tank.

Anti-Taurus. A mt. range in Asia Minor, the exact nature and extent of which are doubtful. It is generally regarded as being the range which begins near Mt. Argeus, 12,565 ft., and extends for over 200 m. in a N.E. direction.

Antithesis (Gr. *anti*, against; *thesis*, placing). In rhetoric, a sharp contrast or opposition between sentence and sentence, or

sentiment and sentiment. It is used much in the forming of maxims or moral sayings, as in Seneca's "If you regulate your desires according to the standard of nature, you will never be poor; if according to the standard of opinion, you will never be rich." Macaulay's writings are full of antitheses, e.g.: "He had covertly shot at Cromwell, he now openly aimed at the Queen."

Antitoxin (Gr. *anti*, against; *toxikon*, poison for smearing arrows). Medical term for a substance which has the power of neutralising the action of a bacterial poison or toxin. It consists of the serum obtained from the blood of a living animal which has been rendered immune from the disease to be cured, or prevented, by injections of the toxin of that disease. Antitoxin has been used successfully in the treatment or prevention of diphtheria, lockjaw, scarlet fever, typhoid fever, etc. In botany the term is used of a secretion in plants which secures them from injury by microbes.

Anti-Trade Winds. Surface winds which blow over the oceans in latitudes higher than 40°. Because the air currents are moving from low to higher latitudes the rotation of the earth gives them a westerly component, so that in the northern hemisphere these winds are in general S.W. winds, and are frequently called the Westerlies; in the southern hemisphere they vary in direction from W. to N.W., and are called the Brave West Winds, or, incorrectly, the Roaring Forties. The Westerlies vary in speed from about 16 m. per hour in the summer to more than 25 m. in the winter; the Brave West Winds usually exceed 20 m.

Because these winds are oceanic, warm moist air moves towards the westerly shores of the continents and causes rains, which are usually heaviest in the autumn and winter, on the coastal areas which lie in their path. Ireland is rainier than England; British Columbia has a considerable rainfall; the west coastlands of South Island, New Zealand, and of Tasmania are very rainy. The area covered by these winds varies slightly with the seasons; during the winter months the winds are nearer the equator, with the result that the rains on the coasts reach comparatively low latitudes only during the winter. Thus California, the W. Mediterranean countries, Chile, the district round Cape Town, and the S. coastal lands of Australia experience cool wet winters and hot

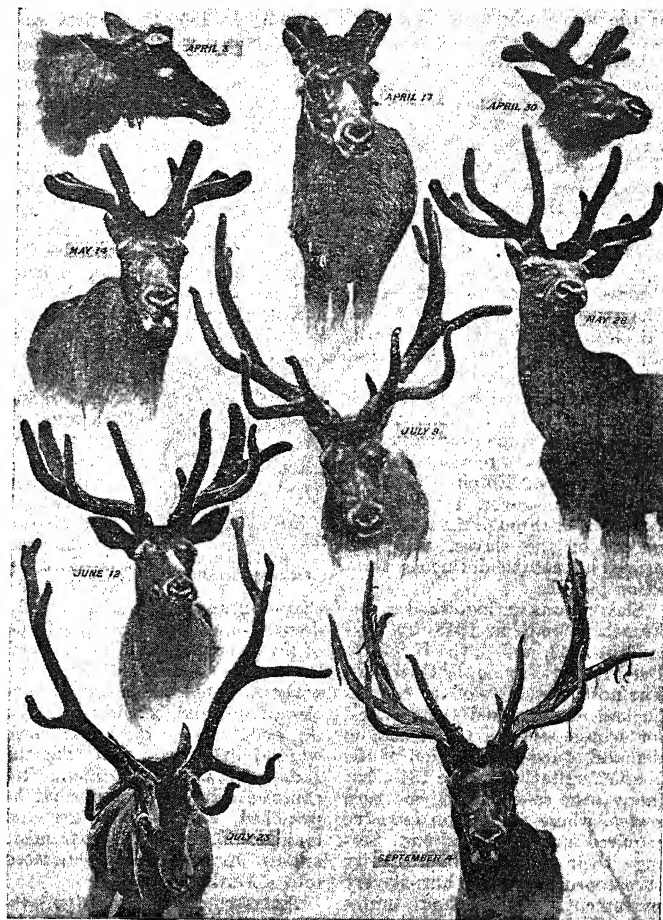
dry summers; i.e. they have "winter rains."

By their comparative steadiness these winds affect the navigation of sailing vessels; they interfere seriously with the "wind-jammers" which sail from the Atlantic to the Pacific round Cape Horn, and cause sailing vessels making the trip round the world to go round the Cape of Good Hope and E round Cape Horn. The first air voyages across the Atlantic were made from W. to E. with their assistance, and the airways of the future will depend to some degree upon the effect which the anti-trade winds have been proved to have on airships and aeroplanes. In any case these winds cause the air navigator considerable trouble by the varying amount of drift they produce. They make signal stations a necessity along the W coasts, especially for night flying.

Antium. One of the oldest cities and ports of Latium, the modern Anzio. It stood 33 m. S.E. of Rome, and was a stronghold of the Volscians and the haunt of pirates. Conquered by Rome, 468 B.C., it revolted, and was finally subdued in 338. Antium became a favourite Roman watering-place, and numerous remains of villas and art treasures have been found, e.g. the Apollo Belvedere and the Borghese Gladiator, and the only pre-Julian Roman calendar. Here the emperors Caligula and Nero were born. See Anzio, Porto d'.

Anti-Vaccination Movement. Agitation to bring about the repeal or the modification of the Vaccination Acts; in other words, to abolish compulsory vaccination. In England Acts passed in 1851, 1867, and 1871 made vaccination compulsory, while Scotland and Ireland were similarly treated. This legislation gave birth to the movement, which, after 1867, and especially in Leicester and other Midland towns, attained large proportions, many parents being prosecuted for failing to comply.

In 1898 an Act relieved parents who declared they had a conscientious objection to vaccination from the necessity of having their children vaccinated. A declaration of belief in the injuriousness of vaccination was substituted in 1907. In 1910 the board of education ceased to enforce their previous vaccination requirements on teachers and trainees. From 1923 post-office employees were no longer subject to obligatory vaccination. The National Health Act, 1946, abolished compulsory vaccination. The National Anti-



Antler. Stages of development in the antlers of a full-grown male wapiti, from the beginning (immediately after the shedding of the old antlers) to the completion of the new growth five months later

Photos, H. Irving

Vaccination League, however, continued its propaganda in the U.K. Its offices are at 25, Denison House, Vauxhall Bridge Road, London, S.W. In most other countries there is strong opposition to vaccination, especially in Canada, Australia, and the U.S.A. See Vaccination.

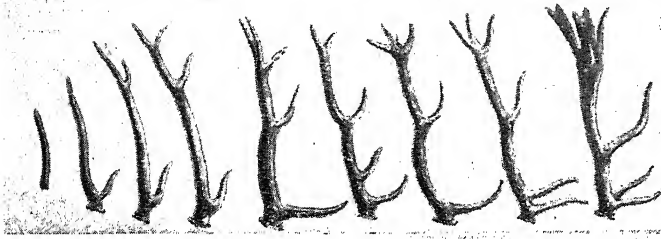
Antivari. Italian name of a town and harbour of Yugoslavia, described under its Yugoslav name, Bar.

Antivenins. Antitoxins prepared from the blood of animals immunised against snake bite and used to neutralise the effect of the venom in persons bitten by snakes. Scorpion antivenin is also available. See Snake Bite.

Anti-Vivisection Movement. Agitation which aims at the abolition of the practice of vivisection. It began about 1876, when the Act still regulating the practice in the United Kingdom was passed

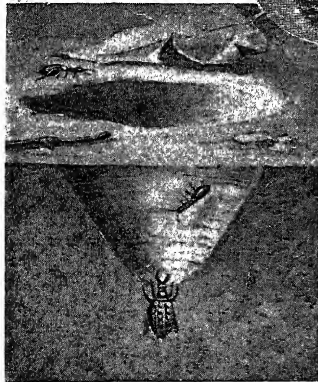
and the National Anti-Vivisection Society was founded by Lord Shaftesbury, Lord Coleridge, and others. The central argument of its supporters is that vivisection involves torture, and as such should not be permitted in any civilized country. The society's work is to watch the operation of the Act of 1876 and to inform public opinion on the subject. It presented its case to the Royal Commission on Vivisection, 1906-8, and has attempted unsuccessfully to pass through Parliament a bill making the use of anaesthetics and stricter regulations obligatory in experiments. Its offices are at 92, Victoria Street, London, S.W. See Vivisection.

Antler (Lat. *ante*, before; *oculus*, eye). Outgrowth from the frontal bone of the deer, usually in the male sex only. Antlers are shed and renewed annually. They spring



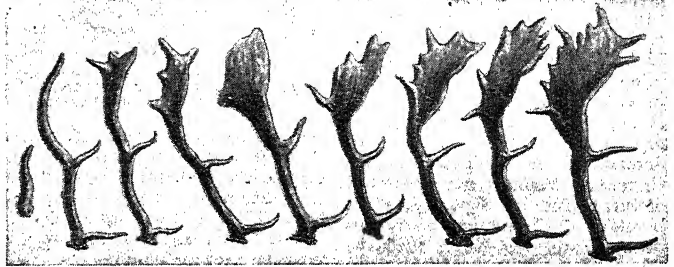
from a stalk or pedicle on the skull, the point of junction forming a bony ring or burr. During the period of growth, usually from April to Aug. in British deer, the antlers are covered with hairy skin called the velvet, which is well supplied with blood vessels and hot to the touch. When the antlers are fully developed, the supply of blood is cut off. The skin then dries up and is rubbed off against the branches of trees. As the deer reaches maturity the number of tines or branches on the antlers commonly increases and indicates the approximate age of the animal. Antlers are used by the males for offensive purposes during the breeding season, when furious fights take place. When the antlers are shed the stags become inoffensive.

Antlia Pneumatica. One of the southern circumpolar constellations named by Lacaille. Its name, meaning The Air Pump, is entirely inappropriate.

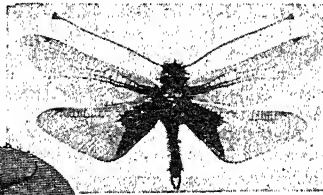


Ant-Lion snaring its prey. In circle, antlion in its larval stage: and, above, the perfect insect of a species which hunts instead of trapping its prey

Ant-Lion (*Myrmeleon*). Larval form of a neuropterous insect, common to temperate and tropical regions, so called from its habit of ambushing its prey. After making a conical pit in the loose sand, it buries itself at the bottom with only its head showing. When some passing insect, such as an



Antlers. Annual development of the antlers of the male fallow deer, from the unbranched horn of its second year to the many-tined one of its tenth. Above: Similar development of the antlers of the red deer



ant, slips over the edge of the pit, the ant-lion throws sand at it to hasten its fall, and then seizes it. After sucking the juices of its prey, the ant-lion hurls the body out of the pit. The ant-lion passes through its pupal stage in the sand beneath its pit, which is about 2 ins. deep and 3 ins. wide at the top, and the perfect insect resembles a dragon-fly.

Antofagasta. Largest prov. of Chile. It has an area of 47,502

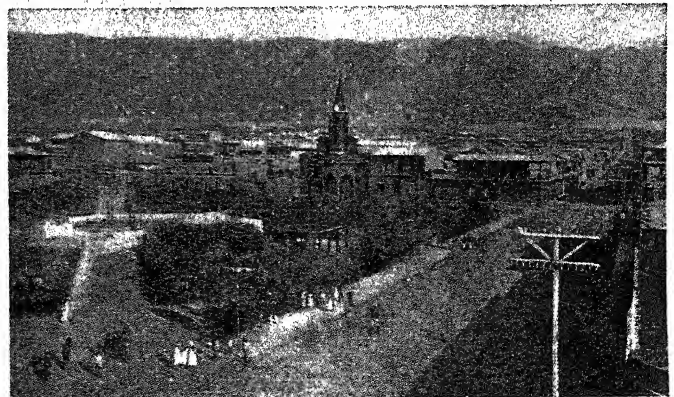
sq. m. It is rich in silver, copper, saltpetre, and other minerals. The desert of Atacama covers the province. Known as Atacama until 1879, it was then captured from Bolivia and finally ceded to Chile in 1885. Pop. 145,147.

Antofagasta. Seaport of Chile. It is the capital of Antofagasta province. It is connected by rly. with Oruro and La Paz, being the

terminus of the Antofagasta and Bolivia Rly. Ships lie in the roadstead and discharge by means of lighters. Much of the trade of Bolivia passes through this port, which is the commercial centre for an extensive mining district. It is a wireless station. Pop. 51,107.

Antoine, ANDRÉ (1851-1943). French theatrical manager and dramatic critic. In 1887 he founded the Théâtre Libre, Paris, renowned for a dramatic realism inspired by the contemporary naturalistic novel.

Antommarchi, FRANCESCO (c. 1780-1838). A French physician, medical attendant on Napoleon during his captivity on St. Helena. He was born in Corsica, and Napoleon bequeathed him £4,000. His *Les Derniers Moments de Napoléon* was published in Paris in 1823.

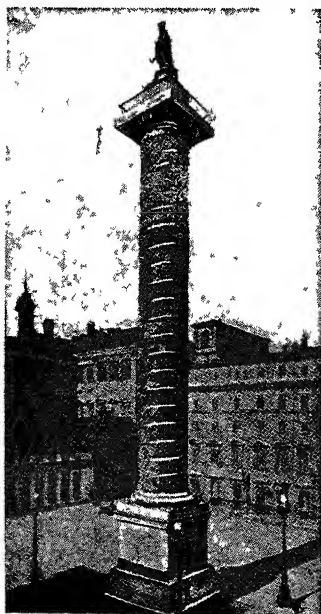


Antofagasta, commercial centre of the great Chilean nitrate industry. The Plaza Colon is on the left, and the Calle Prat on the right

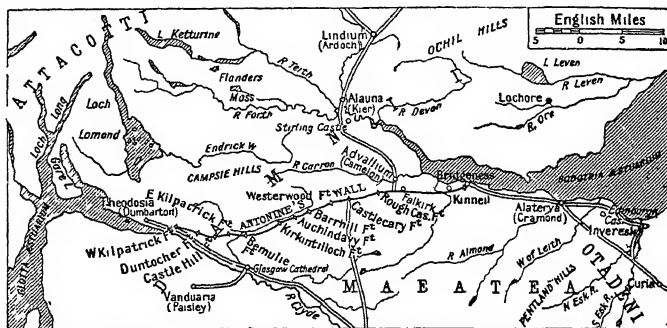
He acted as director of military hospitals in Warsaw during the Polish revolution and died in Cuba, April 3, 1838.

Antonescu, Ion (1882-1946). Rumanian dictator. Born in Transylvania, June, 2, 1882, he saw service with the Rumanian army in the First Great War, being promoted to colonel. Later he was chief of the general staff and war minister. In 1940 he was imprisoned for his opposition to the cession of Bessarabia to the U.S.S.R., but was released by King Carol and appointed prime minister. Supported by the Iron Guard, the Rumanian fascist organization, his first act was to demand Carol's abdication. He thereupon assumed the powers of dictator, and on Sept. 14, 1940, proclaimed Rumania a totalitarian state. In Nov., 1940, he signed Rumania's adherence to the Axis. It was on his order that the Rumanian army in 1941 joined with the Nazis to invade Russia. On Aug. 23, 1944, following the Rumanian defeat, he was arrested, along with his government, by order of King Michael. In May, 1946, the Rumanian peoples' court found him guilty of war crimes, and he was executed June 1.

Antonine Column. Memorial column erected in Rome in honour of the emperor Antoninus Pius. The shaft, about 50 ft. high, has been destroyed, but the decorated marble pedestal is preserved in



Antonine Column in the Piazza Colonna, Rome



Antonine's Wall. Map showing the line of this Roman rampart from the Forth to the Clyde, and the positions of some of its forts

the Vatican. Another Antonine Column commemorated the victory of the emperor Marcus Aurelius Antoninus over the Marcomanni (176), and was set up by his son and successor Commodus. It is in the Piazza Colonna.

Antonines, AGE OF THE Period in the history of the Roman Empire covered by the rule of the emperors Antoninus Pius (A.D. 138-161) and Marcus Aurelius Antoninus (A.D. 161-180). An era of peace and general prosperity, it came to be regarded as the Golden Age of the empire.

Antonine's Wall. A Roman rampart, 36 m. long, between the

Forth and the Clyde. Erected by Lollius Urbicus in A.D. 140-1, it became the northernmost outpost of Roman Britain. Mainly of turf, flanked by a ditch, it was protected by from 10 to 20 forts, some of which, e.g. Camelton and Barrhill, mark the site of Agricola's temporary works of about A.D. 80. The stone-ramparted Castle Cary is well preserved. A sculptured legionary tablet, dedicated to Antoninus, was found at Bridgeness and is now in the National Museum, Edinburgh. The wall was known in early Scottish history as Grim's Dyke and transformed by later legend into Graham's Dyke.



Antonine's Wall, between the Forth and Clyde. 1. Section through the wall disclosing the stone foundation. 2. Exposed foundation showing opening for drainage. 3. View of the wall at Fergusson Moor

Photos Annap

Antoninus Pius (A.D. 86–161). Roman emperor, 138–161. Born Sept. 19, 86, he held with credit



Antoninus Pius,
Roman Emperor
British Museum

several administrative posts and enjoyed the friendship of Hadrian, who adopted him and designated him his successor. The name Pius refers to his affectionate regard for the memory of his patron. During the reign of Antoninus the only serious military operations were those carried on in Britain, where his name remains associated with a military wall constructed between the Forth and the Clyde. Under Antoninus the principles of equity, fortified by the prevailing Stoic philosophy, were more widely introduced into the Roman system of law, and the harsh code which governed the relations between freemen and slaves was considerably mitigated. The provinces were well governed, the arts and sciences encouraged, salaries paid to professors of philosophy and rhetoric, and persecutions of the Christians checked. Antoninus died March 7, 161.

Antonio. Character in Shakespeare's comedy, *The Merchant of Venice*. The plot hinges on his generosity in borrowing money for his friend Bassanio from Shylock the Jew, on condition that, if the money be not repaid at the appointed time, he shall forfeit a pound of his flesh.

Antonio (1531–95). The prior of Crato and pretender to the Portuguese throne. He was a natural son of Louis, duke of Beja, second son of Emanuel I of Portugal, and was unsupported by the nobles or the populace in his claim to the throne. In 1581 he was defeated at Alcantara by Philip II of Spain, and fled to Paris with the crown jewels, among which was the famous Indian diamond known as the Sancy diamond. After making an attempt on the Azores in 1582, and accompanying a futile English expedition against Portugal in 1589, the prior returned to Paris, where he died. He received the wealthy priory of Crato in youth, but was never ordained.

Antonio, ANTONELLO D' (c. 1414–93). A Venetian painter, called Antonello da Messina. He was born at Messina, and after study in Rome and Naples went to Bruges to learn from Jan van Eyck the new method of painting in oils.

He settled in Venice, where he died. He introduced oil painting among the Italians, and happily blended the somewhat hard manner of the Flemish school with the softness and suavity of the Italian. His *S. Jerome in his Study*, in the National Gallery, London, is perhaps his masterpiece, and the *Portrait of a Young Patrician*, at Venice, is also remarkable.

Antonius, MARCUS (c. 83–30 B.C.). Roman statesman and soldier, commonly referred to as Mark Antony. He was of patrician birth and related through his mother to Julius Caesar. In spite of reckless dissipation, his brilliance and daring were recognized by Julius, of whom he became the whole-hearted partisan and by whom he was rapidly advanced. He commanded the left wing of the army of Julius which overthrew Pompey at Pharsalus in 48 B.C. In 44, just before the murder of the dictator, Antony was named his colleague in the consulship. After the murder, the conspirators did not realize how dangerous he was, and he soon took up arms at the head of the Caesarian party. He sought the alliance of Julius's adopted son Octavian, and for a time the future rivals made common cause. They compelled their own appointment, with a subordinate colleague Lepidus, as triumvirs for the restoration of the commonwealth; in effect they were a commission with unlimited authority. Butchering by a proscription their personal enemies, including Cicero, they turned their arms against Brutus and Cassius and the republicans, who were crushed at Philippi, Oct., 42.

The victors, practically ignoring Lepidus, now divided the Roman world, Octavian taking the west and Antony the east. Within two years there was a serious breach, but war was averted by temporary reconciliation. Antony became enslaved by the fascination of the Egyptian queen Cleopatra. But the partition of the Roman world was intolerable to both Octavian and Antony, and in 31 they joined battle for mastery. The victory fell to Octavian's fleet, under the command of Agrippa, in the sea-fight off Actium, Sept. 2; and Antony fled back to Egypt with Cleopatra. He had become incapable of sustained effort, and on the arrival of Octavian next year he put an end to his own life, an example immediately followed by Cleopatra; which secured the complete predominance of Octavian in the Roman empire.

Antony's character is admirably portrayed in Shakespeare's two plays, *Julius Caesar* and *Antony and Cleopatra*; and Dryden's *All for Love* dramatizes his relations with the Egyptian queen. See *Augustus*; *Caesar*; *Cleopatra*.

The grandfather of Marcus Antonius bore the same name and was a lawyer and orator (143–87 B.C.). He distinguished himself against the pirates of Cilicia, of which he was governor in 103. He was consul in 99 and censor in 97. A supporter of Sulla and the aristocratic party, he was put to death by Marius. Cicero ranked him as an orator with the greatest of Greece.

Antonomasia (Greek *anti*, instead; *onomazein*, to name). Use of a descriptive epithet in place of a proper name. Examples are "His Grace of Canterbury" for the archbishop, "the honourable member for ——" instead of the name of the M.P. referred to, "the swan of Avon" for Shakespeare, or "the inspired tinker" for Bunyan.

Antony and Cleopatra. Tragedy by Shakespeare. Antony had met Cleopatra when he was triumvir with Octavius and Lepidus. For her he neglects his first wife, Fulvia, and his second wife, Octavia, sister of Octavius. He quarrels with his brother-in-law for expelling Lepidus from the triumvirate, is defeated by him at the naval battle of Actium, and then, deserted by his friend Enobarbus (Ahenobarbus), after witnessing the surrender of the Egyptian fleet and receiving a false report of Cleopatra's death, falls upon his sword and dies in her arms. Cleopatra, to avoid gracing Caesar's triumph, kills herself by applying asps to her arm and breast.

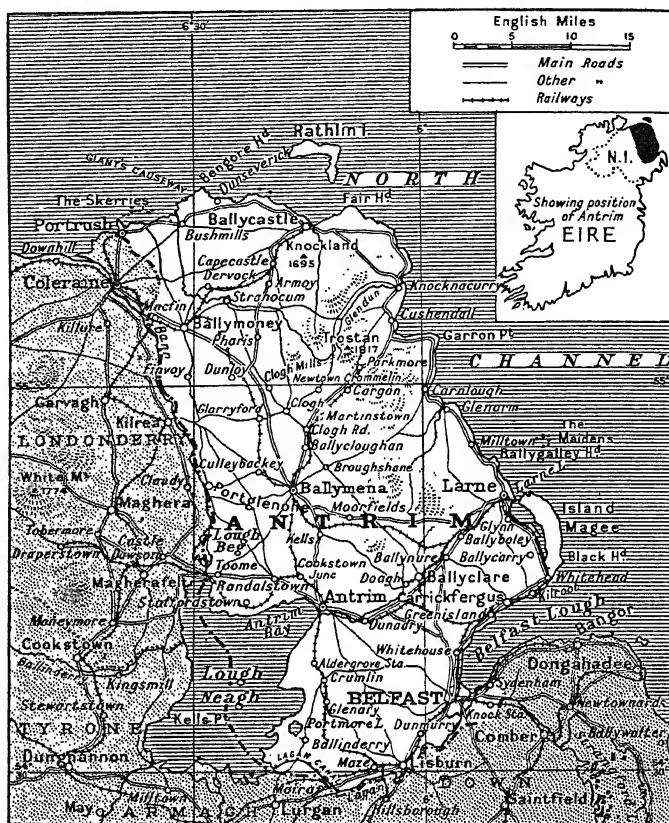
The play was licensed May 20, 1608; first printed in the 1623 folio; and is based upon North's version of Plutarch's *Life of Antony*, much of the text of which is incorporated. Preceded by *Julius Caesar* and followed by *Coriolanus*, it forms the second of the poet's Roman trilogy. There are five acts; the action, with intervals, extends over 12 days, and is quick to the verge of breathlessness. It begins and ends in Alexandria, the scene shifting meanwhile between Rome, Messina, near Misenum, a place in Syria, Athens, and Actium. It contains 2,761 lines of blank verse and 42 pentametric rhymes, as well as passages in prose. Dryden's first drama in blank verse, *All for Love*, or *The World Well Lost*, 1678, was based on this tragedy.

Antonym (Gr. *anti*, against; *onyma*, name). Word bearing the opposite meaning to that of another word. It is peculiarly effective in the statement of a contrast, e.g. A bliss in proof, and prov'd, a very woe (Shakespeare, sonnet 129), where woe is the antonym of bliss. An antonym is thus the converse of a synonym (*q.v.*). Many dictionaries of synonyms and antonyms have been compiled.

Antraignes, EMMANUEL HENRI LOUIS ALEXANDRE DE LAUNAY, COUNT D' (c. 1755-1812). French political agent. After several years of travel he went to Paris, where in 1788 he published his revolutionary Memoir on the States-General. At the outbreak of the Revolution he was elected deputy, but quickly changed his opinions. In 1790 he left France and intrigued on behalf of the Bourbons at the European courts. In 1803 he was sent by Alexander of Russia to Dresden, but was dismissed for writing an anti-Bonapartist pamphlet. He settled in London, and is said to have divulged to Great Britain the secret articles of the treaty of Tilsit. He and his wife were murdered near London, July 22, 1812, by an Italian servant. He encouraged the two Montgolfier (*q.v.*) brothers in their early experiments in aeronautics.

Antrim. North-east maritime and most populous co. of Northern Ireland. Its greatest length is 65 m., greatest breadth 30 m., coastline 90 m., and land area 1,098 sq. m. Rathlin Island and the Skerries, off the N. coast, and the Maiden rocks with two lighthouses, off the E. coast, form part of the co. The chief rivers are the Bann and Lagan, and Lough Neagh is the largest lake. The surface is hilly in the N. and E., and attains its highest alt. in Trostan Mt. (1,817 ft.); much of the interior is bogland. On the north coast is the Giant's Causeway (*q.v.*), a remarkable example of columnar basalt formations.

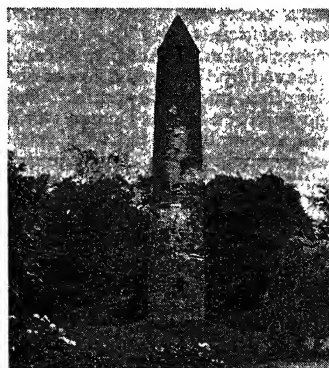
The centre of the linen industry, Antrim has also cotton and woollen manufactures, while oats, potatoes, flax, and cereals are grown in considerable quantities. Good rock salt is obtained near Carrickfergus, iron ore, limestone, and coal are worked, and salmon fishing and distilling engaged in. Belfast, the metropolis, Lisburn, Carrickfergus, Ballymena, Ballymoney, Larne, Antrim, and Portrush are the principal towns. Apart from Belfast, Antrim returns 2 M.P.s to



Antrim, the most populous county of Northern Ireland. It is on the N.E. coast, and in its most northerly part is the Giant's Causeway

Westminster, 7 to the N. Ireland parliament. Pop. excluding Belfast, 213,024. That nearly half are Presbyterians is in large measure due to colonisation from England and Scotland under James I.

Antrim. Market town of Antrim, N. Ireland. It is 22 m. by rly. N.W. of Belfast, near the N.E.



Antrim. One of Ireland's mysterious ancient round towers is found near Antrim. It is 95 ft. high

shore of Lough Neagh. Linen, paper, and woollen goods are made. Near are Antrim Castle, Shane's Castle, and a well-preserved round tower. Market days, Tues. and Thurs. Pop. 1,979.

Antrycide. Synthetic drug developed as a prophylactic against trypanosomiasis, the cattle disease caused by the tsetse fly. See N.V.

Antsirane. Coast town and free port of Madagascar, on Diégo Suarez Bay. Founded in 1885, it is the chief French naval station in the Indian Ocean. On May 5, 1942, British troops, having landed near Antsirane, were held up by Vichy French forces 5 m. S.W., but after the arrival of reinforcements the town was carried by assault May 6, Royal Marines having landed in the defenders' rear. Pop. 15,277. See Madagascar.

Antung. One of China's nine N.E. provinces. It is bordered on the E. by the state of Korea, and is served by the Antung-Mukden rly. As the southern Changpai Mts. are within its borders, the prov. is an important

timber centre. Wheat, kaoliang, and soya beans flourish in the lowlands. Area 43,250 sq. m. Pop. 5,340,000. The capital is the old treaty port of Antung on the Yalu river. Pop. est. 10,000.

Antwerp. Second city and most important port of Belgium, one of the great ports of the world. On the right bank of the



Antwerp arms

Schelde, 55 m. from the sea and 27 m. by rly. N. of Brussels, it is the capital of the province of the same name, and has an estimated pop. of 254,057. Although it has manufactures of cloth, cotton, and silk goods, as well as diamond cutting and other industries, it is chiefly famous as a centre of import and export. While a great tidal river available for ships of the largest tonnage flows past its quays, it is situated two degrees E. of Paris, and is the Continental Atlantic seaport nearest to the heart of Europe. An extensive canal system makes it the great port for the industries of the Rhine and of Belgium itself.

HISTORY. The name (French *Anvers*, Flem. *Antwerpen*) is derived from the practice of punishing pirates or smugglers by cutting off their right hands and throwing them into the Schelde, enforced by Brabo, a semi-mythical governor in the early Frank period. The place appears as *Andhunerbo*—plunging the hand—in A.D. 511. This disposes of Motley's attempt to derive it from "an'twerp," on the wharf. The arms of Antwerp, even in the 9th century, show two severed hands and a castle.

In its early days, Antwerp was a stronghold or barrier fortress against the raids of piratical invaders. It was attacked several times by the Normans; in 836 they captured and burnt the town. It recovered, and in the next century was made into a marquisate to protect the German frontier from attacks by the counts of Flanders. In the 12th century it joined the Hanseatic League, thus beginning its rôle as a commercial rather than political metropolis. For three centuries it was subordinate to Bruges, which had free access to the ocean by the Zwyn, an arm of the sea navigable by the largest ships of the period. This channel began to be sand-locked early in the 15th century, and the comple-

tion of the process, which undermined the prosperity of Bruges, was followed by the transfer of the foreign guilds in 1490 to Antwerp. From that year it was the most important commercial city in Europe. A thousand foreign merchants occupied as many separate houses, and among the most famous of them was Sir Thomas Gresham. These houses were divided among the seven nations, English, French, Spaniards, Italians, Portuguese, Germans, and the Danes and the Hansa counted together. The population exceeded 200,000, and about 500 ships entered or left the port daily in the year. Spices, sugar, silk and gold embroideries, wine and grain were imported in great quantities, and highly valued Flemish carpets, textiles, and gold and silver articles were sent to India, Arabia, and Persia.

Then Antwerp became involved in the wars of religion in the 16th century, and her fortunes declined with those of Spain. The duke of Alva built the first modern citadel on the site of the margrave's castle, but he forgot to pay his men regularly, and they mutinied. The soldiers sought to pay themselves by plundering the citizens. The Spanish Fury of Nov., 1576 raged for three days, when 6,000 citizens were massacred. Then followed a great exodus of the people. A second blow was inflicted in 1585 by Parma, when, on capturing the city, he ordered that all who adhered to Protestantism should leave within a specified period. Thirty thousand emigrated. The United Provinces imposed their terms on Spain.

and closed the Schelde to Antwerp, thus making sure of the pre-eminence of their own ports.

During the 17th and 18th centuries Antwerp sank into complete insignificance, and it was said that one-third of its inhabitants lived on charity. At the end of the 18th century the French Republicans freed the river; but it was not until 1831-32, when England and France forbade the Dutch blockade and kept navigation open, that Belgium recovered the use of her own river for commerce. The First Great War revealed that the Dutch clung to their putative sovereignty, held under the treaty of Munster (1648). Their government closed the river in the face of the Allies to their troops and armaments.

For the Siege of Antwerp in Sept., 1914, almost at the outset of the First Great War, see Antwerp, Siege of. The city remained in German occupation from Oct., 1914, until Nov., 1918.

Description of City

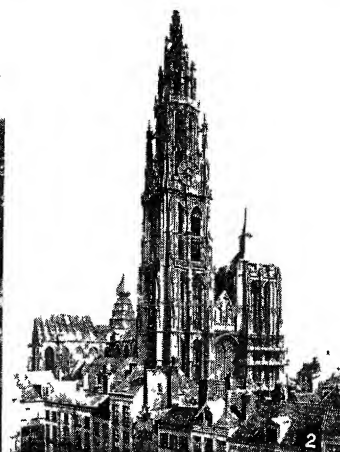
In respect of public buildings, monuments of antiquity, broad boulevards, and residential mansions, Antwerp is not surpassed by any other city in Belgium. The old enceinte was removed in 1859 to give place to the new boulevards which form a crescent round the eastern side of the city, and two large suburbs were then incorporated. A famous street is the Place de Meir, which contains the royal residence, used, however, only on rare occasions. Here also stood the house of Rubens.

The most famous of the old buildings is the magnificent cathedral of Notre Dame, begun

in 1352 but not completed until 1518, the choir being added about 1550. The tower with its spire is 470 ft. high. The cathedral, in its beautiful design, has been compared to point lace. It contains some old glass, a fine pulpit, and masterpieces of Rubens. In the church of S. Jacques, completed in the 15th century, is the chapel of the Rubens family, and his painting of his family in



Antwerp. Plan of the main part of this Belgian city



Antwerp. 1. The square of the Hôtel de Ville, looking across the Schelde. 2. The Cathedral. 3. Place de Meir, showing the Boeventoren skyscraper. 4. The Steen (part of the old castle, now a museum) with the quays

an allegorical form, including himself in the guise of S. George.

The Guild Houses, the Hôtel de Ville, and the Plantin Museum all date from the 16th century. The last named was the residence and workshop of the great printers, Plantin and Moretus, and was sold to the city in 1876. The Steen on the quay represents the old castle. It has undergone a modern restoration, but the dungeons are at latest of the 10th century.

Among modern buildings may be named the Royal Museum, the Flemish Opera House, the Law Courts, and the National Bank. The museum, 1879-90, has a superb collection of paintings by the old masters, including many of the early Flemish school, and some 500 works by modern painters. Thoroughly modern in equipment are the quays which extend for 5 m along the right bank of

the river. The Zoological Gardens rank among Europe's best.

By 1939, 158 shipping lines (about 2,000 ships) used the port regularly, and about 80 others maintained less regular services. One quarter of the ships entering the port were British. In 1905 a scheme of improvements to cost nearly £10,000,000 was sanctioned. Further extensions and improvements were made shortly after the First Great War, and by 1940 there were 26½ m. of dock frontage, and 3½ m. of riverside quays. In the harbour area alone there were 500 m. of railway track.

Antwerp: 1940-45

In the Second Great War Antwerp fell into German hands on May 18, 1940, without having played any direct part in the defence of Belgium.

While the city was in German occupation little information came

out. In the summer of 1940 the enemy concentrated in the port and estuary numbers of barges and similar craft for the projected invasion of Britain. These vessels were repeatedly bombed by the R.A.F., and during the ensuing years of the war there were frequent attacks by Allied aircraft on military objectives in the neighbourhood. After the Allied landings in Normandy during June, 1944, and the subsequent operations that led to the reconquest of France and Belgium, the city and port of Antwerp became a major objective as a potential supply base for the Allied invasion of Germany.

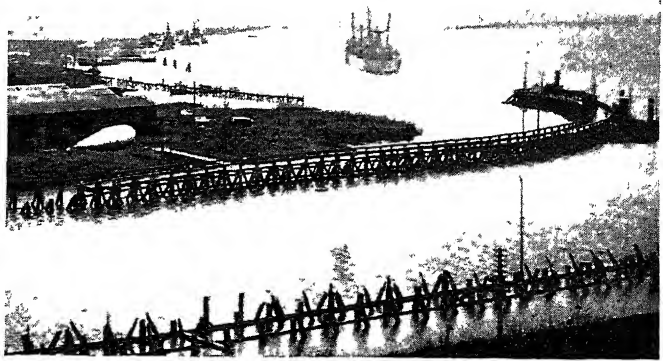
Though Antwerp was liberated from the Germans on Sept. 5, 1944, the port could not be brought into use until enemy forces occupying the islands of the estuary had been expelled, and Allied control estab-

lished over the mouth of the Schelde. By the middle of November this had been accomplished, and the great port was captured almost intact. (See Walcheren.) A fortnight later Antwerp began again to receive ocean-going ships, and soon became one of the chief supply bases for the Allies.

Up to that time the damage inflicted on the city had mainly consisted of destruction by German artillery fire in the port district and the suburb of Merxom. The Boeventoren skyscraper was also damaged. Two tunnels under the Schelde were rendered unusable by the Germans before they left. But between Oct., 1944, and March, 1945, Antwerp became a principal target for German V-bombs, 700 of which fell in the area. Half the total number of houses in Antwerp were destroyed, while 5,000 people were killed and 21,000 wounded. The object of these attacks was the destruction of the port to prevent Allied supplies going through. British troops of the Pioneer Corps and the No. 1 Overseas column of British Civil Defence were in action in Antwerp throughout the period.

Antwerp, SIEGE OF, 1914. This was one of the most significant operations of the first autumn of the First Great War because of its bearing on the "race to the Channel ports." It was begun by the German General von Beseler with 125,000 men on Sept. 27, 1914. The forts guarding Antwerp were shown at once to be powerless against the huge German guns, and the Belgians prepared to evacuate the city, but to defend Termonde and the country W. of the Schelde, so as to keep a line of retreat open for their field army. 100,000 strong.

On Oct. 3 Mr. Winston Churchill arrived from London with a promise from Great Britain and France that, if the defence of the city could be prolonged three days, they would inform Belgium whether or not a relieving army could be sent and in what strength. In any event the British 7th division would be moved to Ghent to cover the Belgian retreat, and naval brigades and heavy guns dispatched to Antwerp to assist in protracting the resistance. Some 2,200 British marines arrived late on Oct. 3, followed by 6,000 men of the Royal Naval Division, mostly without proper equipment, on October 5-6.



Antwerp. First ship of an Atlantic war convoy to arrive in the great Belgian port after its liberation by the British in November, 1944

From Oct. 6, however, the bombardment was intensified; the Belgian field army withdrew towards Ghent; officials, refugee civilians, and troops poured out of Antwerp; and on Oct. 9 the city surrendered and was entered by the Germans. About 200 civilians had been killed, while the British losses were 37 killed, 193 wounded, 1,560 interned in neutral Holland, and 800 prisoners. Yet the movement of a British force to Antwerp had prolonged by some days the resistance of that place, and detained a large German force which otherwise might have pushed through Ypres to the sea and captured the Channel ports.

Anu. Principal and most ancient deity of Babylonian and Assyrian myths. His name is found in the earliest of transcribed inscriptions. He was the chief of the

upper triad of deities, representing heaven, while Bel or Ellil, and Ea represented the earth and the lower regions.

Anubis. Egyptian deity. The reputed son of Osiris and Nephthys, the rising and the setting sun, he was primarily a twilight god. He is represented as jackal-headed, was the sombre guardian of the

dead, and presided over embalmings. He was later identified with the Greek Hermes. Under the New Empire he watched the scales at the weighing of souls before Osiris in the under-world. See Amanti; illus. p. 455.

Anupshahr. Town in the United Provinces, India. It stands on the Ganges, 70 m. E.S.E. of Delhi, is ill-built and crowded, and is a place of pilgrimage.

Anuradhapura. Ruined city of Ceylon. It is 84 m. N. of Kandy on the rly. from Colombo. The capital of Ceylon from 437 B.C. to A.D. 750, it is famed for its ancient monuments and its Bo tree. In its grand proportions, 256 sq. m., in the number and beauty of its temples, and in population, it vied with Babylon and Nineveh. The cleared environs contain some 3,600 people.

Anvil. Commonly a block of iron having a flat steel surface upon which metals are forged or wrought by hammering, as by blacksmiths, goldsmiths, etc. The block has at one end a substantial conical projection termed a beak or horn, for use in bending operations. The anvil is provided with holes for the reception of tools, such as swages or cutters. Heavy anvils are mounted upon wooden foundation blocks; those for steam or power hammers, and for punching and other machines, are embedded to a considerable depth and supported upon piles of masonry.

Anzac. Popular designation of the troops from Australia and New Zealand who fought in the First and Second Great Wars. The word was generally supposed to have been derived from the initial



Anubis,
Egyptian deity
British Museum

letters of the words Australian (and) New Zealand Army Corps. It seems to have had an earlier origin in an Arabic word meaning "to cause to jump," being possibly suggested by the nickname Kangaroos applied to Australian troops when quartered in Egypt. The name was also given to the cove, N. of Gaba Tepe, Gallipoli, where they landed on April 25, 1915. The date is still celebrated annually as Anzac Day.

The word was officially adopted by the War Office in 1916, and so popular did it become that in Nov., 1916, an Anzac (Restriction of Trade Use) Bill was passed into law prohibiting the use of the word for trade purposes. Previously Australia had made the use of the word as a trade mark illegal.

Anzin. Town of France, in the department of Nord. On the Schelde, it has developed from a suburb of Valenciennes into a coal-mining town. During the First Great War it was in the occupation of the Germans. The largest mining company is the Compagnie d'Anzin, founded 1716. Pop. 15,300.

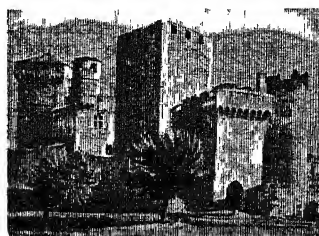
Anzio OR PORTO D'ANZIO. Fishing harbour and seaside resort of Italy, the ancient Antium (*q.v.*). It is 33 m. S.E. of Rome. Until the Second Great War and the battle of the Anzio beaches in Jan., 1944, its principal interest consisted in its antiquarian remains.

Anzio Beaches, BATTLE OF THE. Operations of the Second Great War. On Jan. 22, 1944, full-scale landings were made on beaches N. of the Italian port of Anzio by Anglo-U.S. forces under the protection of powerful naval and air cover. Landings were also made simultaneously at Nettuno, a small resort a few miles E.N.E. of Anzio. A strong bridgehead was effected and the Anzio port area became the centre of prolonged and bitter fighting between the British-American and German forces. The main purpose of the landings was to disrupt the German lines of communication between Rome and their strong position at Cassino opposite the main Allied 5th army, to force the Germans to withdraw in whole or in part from that position, and to break up their strong southern front, against which the 5th army had long been hammering.

Allied casualties on the first day of the landings were fewer than 100. Nettuno was captured two days later, and points were reached near the Appian Way, a few miles beyond the Pontine

Marshes. A constant stream of troops, tanks, guns, and supplies of all kinds continued to pour on to the beaches, and within a fortnight the advance from the bridgeheads threatened to engulf Littoria, Aderna, and Carroceto (Agrilia). Kesselring, commander of the German armies in Italy, waged a series of powerful counter offensives in an attempt to drive the invaders back to the sea. He reduced the Allied salient, but was unable to smash through to the coast. Anzio and Nettuno were subjected to heavy long-range shelling, and during Feb. the Germans succeeded in capturing a number of villages and important positions some 10 m. N. of Anzio harbour, Kesselring employing some 50,000 troops on the whole of the Anzio front, strongly supported by tanks and artillery. Fighting increased in intensity and casualties were heavy on both sides. In March the Germans tried to bring the entire bridgehead under constant bombardment, and six divisions faced Anzio, their purpose being to drive a wedge. This, however, they were unable to do owing to Allied superiority in tanks and planes. By April 17 the Luftwaffe had made some 270 attacks on the bridgehead, but because of heavy losses they abandoned raids at the end of that month. But German pressure on all sides of the salient remained powerful, and it was not until May 25 that patrols from the bridgehead linked up with patrols from the advancing main 5th army a few miles S.E. of the bridgehead, on the coastal highway between Terracina and Anzio. As a result, a unified Allied front stretched across Italy, 25 m. S. of Rome at its nearest point, and made the advance on Rome immediately feasible. See Italy in the Second Great War.

Anzoategui. A state of Venezuela. It is bounded N. by the Caribbean Sea, W. by Guárico, E. by Monagas, and S. by the Orinoco. Cattle-raising is the chief indus-



Aosta, Italy. The Château of Fénis, built by the Counts of Challant, between Châtellon and Aosta

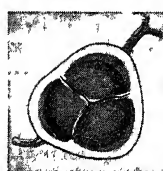
try, and coffee, coal, and hides are the principal products. Barcelona is the capital. Pop. 136,573.

Aomori OR AWOMORI. Harbour of Japan, on the N. shore of Honshu island. It stands at the S.W. angle of Rikuoqu Bay, 22 m. by rly. N.E. of Hirosaki, is connected by rly. with Tokyo, and has a steamer service to Hakodate. Capital of the northernmost prefecture of Honshu, it became an open port 1906. Pop. 93,413.

Aonla. Town of the United Provinces, India, 21 m. S.W. of Bareilly. It contains the tomb of Ali Mahomed, the Rohilla chief.

Aorist (Gr. *a*, not; *horizein*, to bound). Tense of the Greek verb expressing momentary or completed action in the past, the result of which does not continue to the present time, *e.g.* I found it yesterday. In English grammars this tense is called preterite, perfect, or simply past.

Aorta (Greek *aerrein*, to raise). Main artery of the body. It originates or arises, hence the



Aorta, cross section, showing the valves

name, from the left ventricle of the heart, and having passed over the root of the left lung, descends in front of the vertebral column into the abdomen.

There it divides into the two common iliac arteries. See Anatomy.

Aosta. City of Italy, in Aosta province. The ancient Augusta Praetoria Salassorum, it stands at the confluence of the Dora Baltea with the Valpelline, 49 m. direct and 80 m. by rly. N.N.W. of Turin. Its strategic position at the junction of the routes over the Great and Little St. Bernard induced Augustus to found a military camp here in 25 B.C. Its Roman walls are well preserved, as are the Porta Praetoria and two other gates and the Arch of Augustus. It has a 14th century cathedral, the church of Sant' Orso, dating from the 5th but rebuilt in the 12th century, a 15th century priory, and ruins of a Roman theatre, amphitheatre, baths, bridges, etc. It trades in wine, leather, and cheese. The Val d'Aosta, whose inhabitants are mostly French-speaking, is noted for its pine trees, minerals, and mineral springs. Pop. 23,641.

Aosta, DUKE OF. Italian royal title. Emmanuel Philibert, duke of Aosta (1869-1931), was the eldest son of Amadeus, king of Spain 1870-73, and grandson of Victor

Emmanuel II. king of Italy. Born at Genoa, Jan. 13, 1869, he was married in 1895 in England to a Bourbon princess. In the First Great War the duke led the 3rd Italian army, and was largely responsible for the capture of Gorizia from the Austrians in Aug., 1916. He died July 4, 1931.

His elder son, Amadeo Umberto (1898-1942), cousin of King Victor Emmanuel III of Italy, was born Oct. 21, 1898.

In 1927 he married princess Anne of France, daughter of the duc de Guise, and ten years later succeeded Graziani as viceroy of



Amadeo Umberto,
2nd duke of Aosta

Abyssinia. On Italy's entry into the Second Great War in 1940, he was appointed Italian C.-in-C., East Africa. In April, 1941, he and his government fled from Addis Ababa before the British Imperial forces entered the city, and subsequently took up headquarters at Amba Alagi (*q.v.*). Having surrendered with 19,000 troops to the British on May 19, he was sent as a prisoner to Kenya, where he died in captivity, March 3, 1942. His elder brother, the duke of Spoleto (b. 1900), who succeeded to the title, married princess Irene of Greece in 1939. On May 18, 1941, he was created King Tamislav of Croatia at the instigation of Mussolini, though he never visited his kingdom, and after the fall of Mussolini in July, 1943, renounced all pretensions to the throne.

Apache. Group of N. American Indian tribes formerly occupying parts of New Mexico, Arizona, and Texas. Of Athapaskan stock, their name (Zuñi *enemy*) properly denotes their Navaho neighbours. Daring horsemen, they caused much trouble in the U.S.A. until shepherded into reservations. They number about 6,500.

The name was assumed by Paris hooligans, who became obnoxious by resorting to murder and outrage. One of the most notorious apaches was a Russian, a native of Pskov, known generally as Peter the Painter and to the police as Piatkov. Peter had been a house-painter at Marseilles. The Danse d'Apache, a portrayal of the hooligan costume and temperament, was first presented by Max Dearly and Mlle. Mistinguette at the Moulin Rouge, Paris.

Apalachee Bay. Opening on the S. coast of Florida, U.S.A., forming an arm of the Gulf of Mexico. About 90 m. across, it receives several small rivers and is a safe harbour for small vessels. Its mean depth is about 18 ft. The Apalachee river, known also as S. Mark's river, rises near the N. border of Florida and flows S. by W. into Apalachee Bay.

Apalachicola. River of Florida, U.S.A. Formed by the confluence of the Chattahoochee and Flint rivers, at the S.W. extremity of Georgia, it flows S. to the Gulf of Mexico, through the Bay of Apalachicola. Its length is 90 m., and it is navigable throughout by steamers. The city and port of Apalachicola, at its mouth, exports lumber, naval stores, and cotton, and has a monument to Dr. John Gorrie, inventor of the cold-air refrigeration process. It is on the Apalachicola Northern rly. Pop. 3,268.

Apam. Town of Mexico, in the state of Hidalgo. It stands on an elevated tableland, 57 m. by rly. N.E. of Mexico City. Maguery, or agave, from which the national drink pulque is made, is largely grown, and the town is one of the most important depots of the pulque industry.

Apanage or **APPANAGE.** This is, strictly, a portion of land or property set aside for the support of a younger son. At present the word has a somewhat wider meaning, and may be defined as a perquisite, something attached to something else; for instance, the duchy of Lancaster is an apanage of the crown of England, and Easter offerings are an apanage of a church living. It is a French word derived from the Latin, meaning literally to give bread (*panem*) and so to provide. See Primogeniture.

Aparri. Town of the Philippine Islands. It stands on the N.E. coast of Luzon, at the mouth of the Cagayan river. Though subject to earthquakes, it is the only practicable harbour on the N. coast of Luzon. Tobacco and rice are grown in the district.

Before the Japanese invasion of the Philippines in December, 1941, enemy agents prepared a landing ground at Aparri, camouflaged as a ricefield. Japanese aircraft landed on Dec. 8, and a few days later were operating against U.S. and Filipino forces defending Luzon. The town was recaptured by U.S. troops and Filipino guerrillas on June 22, 1945.

Apatin. Town in the Dunavska district of Yugoslavia. On the left

bank of the Danube, it is the last important town before the mouth of the Drave is reached. It is 12 m. by rly. S.W. of Zombor, on a loop line from that town to Gombos, where the rly. crosses the Danube. It is a farming centre on the Alföld, and the only town close to the river bank in a reach of more than 50 m.; there the land is higher and the river marshes are to the W. on the right bank. The town has the largest German colony in the district between the Danube and the Tisza. The Germans are descended from settlers sent by Maria Theresa to colonise the lands recaptured from the Turks in the 18th century.

Apatite (Greek *apatē*, deceit). Calcium fluo- or chloro-phosphate. It is an hexagonal mineral occurring chiefly as segregations from plutonic igneous rocks and in metamorphosed phosphatic limestones. The fluo-phosphate, or fluor-apatite, is usually found in pegmatites and other segregations from acid igneous rocks; the chlor-apatite is more often associated with basic rocks such as gabbros and norites. It is widely distributed in all igneous rocks as microscopic crystals and as such is occasionally met with in sedimentary rocks. Under the name of mineral-phosphate it is mined chiefly in Canada and Scandinavia, and is used as a manure. Its name is due to the fact that its appearance is deceptive, it being frequently confused with other minerals. See Rocks.

Ape. Term applied to the tailless or short-tailed anthropoid members of the order Primates, e.g. the gorilla and chimpanzee, and the Barbary ape. Until the 16th century it was the general word for a monkey.

Apeldoorn. Town of Holland, in Gelderland province. It is 26 m. by rly. E. of Amersfoort, and is served by canals. It has numerous paper-mills, whose produce goes chiefly to the East Indies, textile manufacturers, and copper foundries. The Oranje and Wilhelmine are the finest of several attractive parks. Near is Het Loo, the summer residence of the Dutch sovereigns. It was the favourite hunting-lodge of William of Orange. Pop. 71,158.

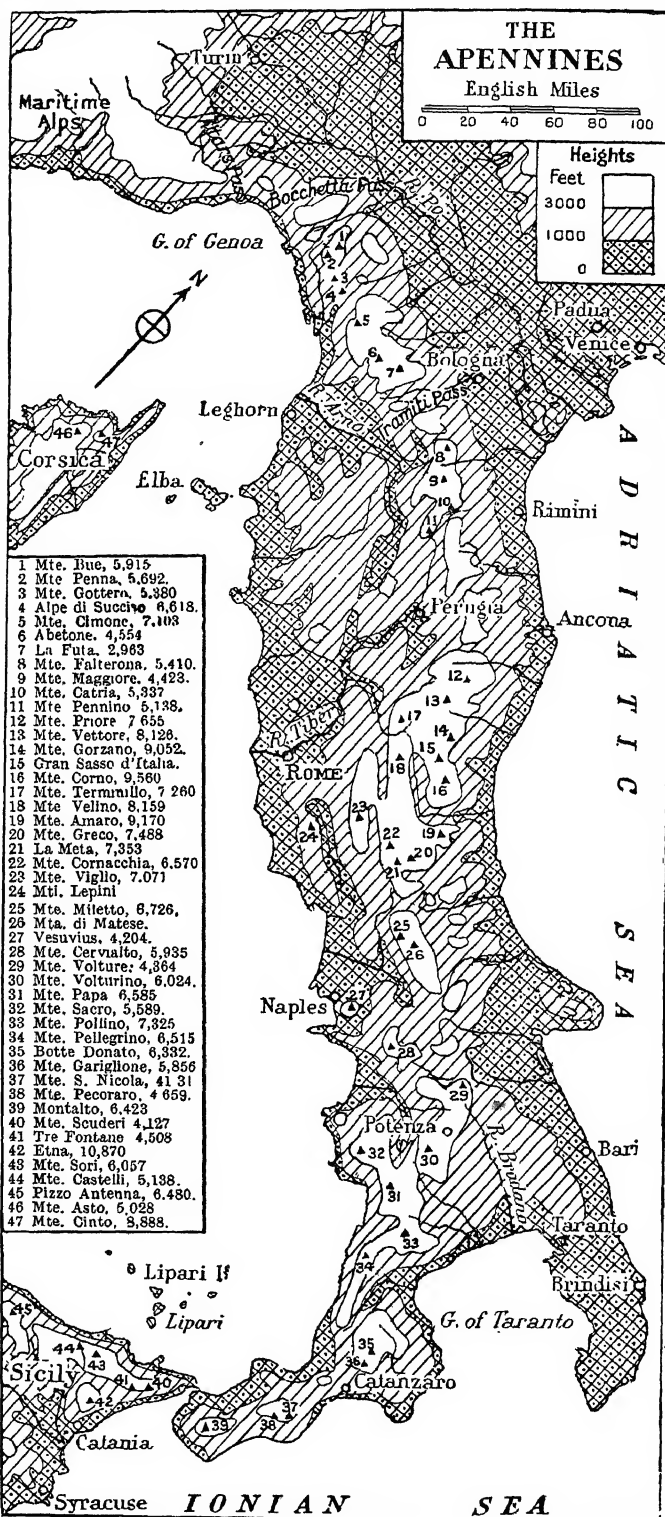
Apelles. A Greek painter. He flourished in the latter half of the 4th century B.C., and was probably born at Colophon in Ionia, in Asia Minor. The universal opinion that he was the most accomplished painter of classical times is founded

on fact. He is credited with having discovered a very thin black varnish to preserve a painting and improve its tone, something akin to the modern glazing process. He painted on panels and not on the wall. Apparently he preferred the single figure to more elaborate compositions. His portrait of Alexander the Great wielding a thunderbolt and his Venus Anadyomenē, or Venus rising from the Sea, were two of the most famous works of art in antiquity. None of his works has survived.

Apennines. Mountain range of S. Europe. The mts. traverse the entire length of Italy, reappear in Sicily, and have a length of about 800 m. Geographically divided into three sections, viz. northern, central, and southern, the Apennines start from the Maritime Alps, as they traverse the peninsula they bear various local names, e.g. Etruscan, Roman, Neapolitan, and Calabrian Apennines, and form the watershed between the Mediterranean and Adriatic Seas.

Always steep where they approach the sea, in central Italy the Apennines broaden out into parallel chains, terraces, and plateaux. They have their greatest height in Abruzzi e Molise, where the E. of the two parallel chains of the Gran Sasso d'Italia attains an alt. of 9,560 ft. in Monte Corno. Other peaks from N. to S. are Monte Cimone, 7,103 ft.; the Monti Sibillini, rising in the peak of Vettore to 8,126 ft.; Monte Terminillo, 7,260 ft., Monte Velino, 8,159 ft., Monte Amaro, 9,170 ft., Monte Pollino, 7,325 ft., and Montalto, 6,423 ft., the highest peak of Aspromonte. Among the lateral valleys formed by parallel ranges are the Florence-Pistoia, the Aterno, and the Chiana. On the W. side fairly large river-basins occur, but on the E. the streams are short and rush to the sea through precipitous valleys.

The Apennines are crossed by 13 principal passes, many being Roman roads, e.g. the Via Salaria and Pietra Mala; seven are traversed by rlys. There is no region of perpetual snow, and there are no glaciers. Generally monotonous, the great wall of mountains is often dreary and barren; poor grass and scrubby bushes cover large tracts. Much of the forest timber has been felled, and only where the mountains dip





Apennines. Monte Corno (9,560 ft.), part of the Gran Sassa d'Italia, or Great Rock of Italy, the highest part of the Apennine range

down to the sea, as in the Riviera and round the Gulf of Naples, is there rich vegetation. In the picturesque portions of the Abruzzi wolves, wild boars, and occasionally bears are found.

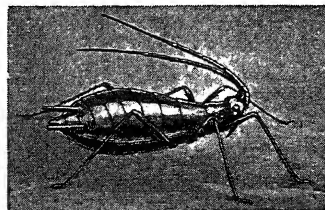
The Apennines lack minerals, though they contain various mineral springs. Geologically they are composed of Mesozoic and Tertiary beds, including Triassic, Jurassic, Cretaceous, Eocene, and Miocene beds, containing granite, gneiss, slate, sandstone, limestone, and marble. From Vesuvius to Etna they are subject to volcanic and seismic disturbance. Consult Six Months in the Apennines, N. McN. Stokes, 1892.

Apenrade or **AABENRAA**. Town of N. Slesvig, Denmark, 38 m. N. of Slesvig on the Apenrade Fjord. Its industries are mainly shipping, fishing, and shipbuilding, and it caters for visitors. See Slesvig.

Aperient (Lat. *aperire*, to open). Medical term for a preparation which produces gentle action of the bowels. The most familiar purgatives include cascara, castor oil, senna, and rhubarb.

Apex. Latin word meaning in general a point, specially used in connexion with the sun. The sun, with its attendant planets, is moving through the so-called fixed stars towards a point in the heavens which is called the apex of its motion. In this direction the stars (apart from their own individual motions) are apparently separating from each other owing to the sun's approach; stars in the opposite direction, towards the antapex, seem to be closing in. Around the great circle halfway between these points the apparent motion of the stars is a reflection of the solar motion. The direction of the motion can therefore be found from a study of stellar

proper motions (*q.v.*). The speed as well as the direction can be found from measurements of radial velocity (*q.v.*). Stars close to the apex tend to have radial velocities of approach, stars near the antapex seem to be moving away, while stars halfway between have on the average no systematic radial velocity at all. When the velocities peculiar to the individual stars are eliminated by averaging amongst a large number of stars, the true solar



Aphis. Specimen of the rose aphid, or green-fly, greatly magnified

motion remains. The sun is found to be moving at about 13 m. per sec. towards the apex in the constellation of Hercules at right ascension 18 hours, declination +30 degrees.

Aphasia (Gr., speechlessness). Disorder of speech due to haemorrhage into the brain from the bursting of a blood vessel or disease of the brain. In this condition the patient's muscles of speech are not affected, and he may show that he quite understands what is said to him, but he is incapable of expressing his thoughts in words. Sometimes there is merely a blurring of speech or hesitancy in utterance; in other cases words are mixed up and wrong words used; and in severe cases the patient may be completely dumb. Reading and writing are also usually

interfered with. After an attack of apoplexy resulting in aphasia, considerable power of speech may be regained as time goes on, and sometimes a good deal can be done by re-education. See Brain.

Aphelion (Gr. *apo*, from; *helios*, sun). Point in an orbit of a planet or a comet farthest from the sun.

Aphis. Name given to a large group of insects of the bug family (Hemiptera), popularly known as green-fly or plant lice. Soft-bodied, usually wingless, with prominent eyes and a suctorial beak which is kept thrust into the tissues of the plant infested by them, they spend their whole time in sucking the juices, often with disastrous effect. The surplus food is discharged as honeydew through the anus. This falls as a kind of varnish on the leaves and stem of the plant, choking its breathing pores. Ants are extremely fond of honeydew. Near the tail end of the aphis is a pair of tubes through which drops of a waxy fluid are secreted.

In spring the eggs of the aphis hatch out as females. These in a few days give birth to young ones by parthenogenesis or virgin birth. These young repeat the process when only a few days old, and so on through the season. In the late autumn males are born as well as females. These unite sexually and eggs are laid which hatch out in the spring. The only remedy for the ravages of aphides is to spray the plants with derris or nicotine, or to fumigate plants under glass. See Insects.

Aphonia (Greek *a*, not; *phonē*, voice). Loss of voice. In the majority of cases this condition is due to either hysteria or neurasthenia, the patient's organs of phonation being quite free from disease, though owing to a deficiency in will-power he is unable to produce any sound and can only speak in a whisper. Aphonia may occur in persons who are overworked, worried, or distressed, or it may be the result of sudden severe shock, either mental or physical. Rest and freedom from worry are essential in the treatment, and sometimes a sudden stimulus, such as the unexpected receipt of good news, will effect a complete cure. Aphonia due to disease or paralysis of the vocal chords in the larynx is a less frequent but much more serious condition. See Voice.

Aphorism (Greek *apo*, from; *horos*, boundary). Brief definition of a principle, artistic, moral, or scientific, in the most concise

terms, *e.g.* Life is short: art is long. Greek literature contains a number of aphorisms and Bacon's Essays abound in them.

Aphrodite. In classical mythology, goddess of love and of the fruitfulness of nature. Her Roman counterpart was Venus. According to some she was a daughter of Zeus, according to others she rose from the foam of the sea, near Cyprus; hence the name Aphrodite (Gr. *aphros*, sea-foam).

Aphrodite's husband was Hephaestus (Vulcan), but she had amours with Ares, Hermes, Dionysus, and Poseidon among

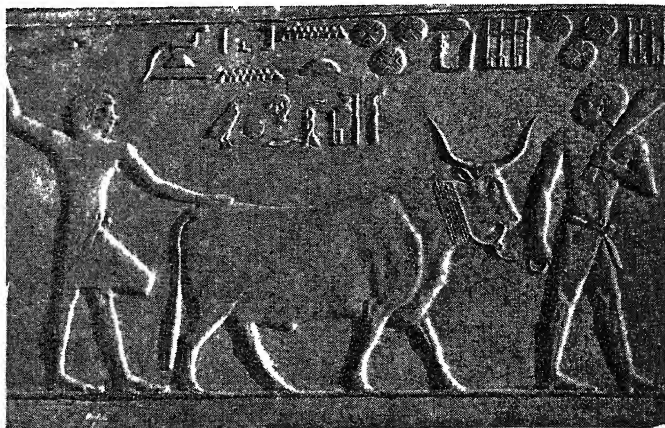


Aphrodite. Bronze head from an ancient colossal statue
British Museum

the gods, and with Adonis and Anchises among mortals. From her connexion with Ares she is also somewhat curiously regarded as a goddess of war, who takes special interest in arms and armour. By Ares she was the mother of Eros or Cupid. During the Trojan War she favoured the cause of the Trojans and constituted herself the guardian of Paris and Aeneas.

The worship of Aphrodite appears to have been of Eastern origin, introduced by the Phoenicians. It was widely diffused, its chief seats being Cyprus and Cytherea, and was frequently marked by sexual excess. Her girdle or zone was supposed to possess miraculous power to excite the passions of love: the goat, the deer, and the dove were sacred to her, and among plants the rose and the myrtle. Aphrodite is the subject of numerous works of art, among them the Venus of Milo (Melos) and the Venus de' Medici. See Adonis; Venus.

Apia. Chief town and seaport of the Samoan Islands. It is situ-



Apis, the sacred bull. Figure in relief found in the tomb of Ephto Stopte at Sakkara

ated on the N. coast, and is the capital of the former German dependency of Upolu. It is the commercial centre of the Samoan group, has an open roadstead and a high-power wireless station, and exports cocoa and copra. In 1889 a hurricane caused the loss of one American and two German warships, the British warship Calliope alone escaping. Robert Louis Stevenson, who settled at Apia in 1889, died here, Dec. 3, 1894. The town was surrendered to a New Zealand force early in the First Great War. Pop. 1,500, including 400 Europeans.

Apicius, MARCUS GAVIUS. Roman epicure. He lived under the Emperor Tiberius, 1st century A.D., and apparently spent the whole of his time and fortune in inventing and eating new and tasty dishes. Then, his money gone, he hanged himself. He is mentioned by Seneca. A book on cooking, *De Re*

Coquinaria, once attributed to him, is of much later date.

Apis. Sacred bull worshipped at Memphis throughout dynastic Egypt. Symbolising the second life of Ptah, he bore a white forehead mark upon a black hide. At death he became, like human souls, one with Osiris, and his embalmed remains were enshrined in a huge costly sarcophagus. The Sakkara mausoleum still contains twenty-four of these Apis-tombs. See Animal-worship.

Aplanatic (Gr. *a*, not; *planasthai*, to wander). Term used in optics. A beam of light reflected in a mirror or passing through a lens is subject to chromatic aberration due to unequal dispersion of the different coloured rays, and to spherical aberration due to the size of the spherical surface. An aplanatic lens is one in which both these aberrations have been corrected. See Light; Optics; Spectroscopy.



Apia, Samoa. Government House, once the home of Robert Louis Stevenson, who died here in 1894

Apnoea (Gr. *a*, not; *pnein*, to breathe). Temporary cessation of breathing produced by breathing more rapidly than physiological requirements demand.

Apocalypse (Greek, unveiling). Name given to a particular type of religious literature very popular in later Judaism and early Christianity. Of it the Book of Revelation which closes the New Testament is the best known example. Apocalyptic—the word used to denote the faith embodied in the different Apocalypses—was the lineal descendant of Hebrew prophecy, but differed from it in that its whole outlook was turned to the future. The dream of national greatness, which is one of the special themes in prophetic literature, had faded away under the disasters and defeats which the Jewish people sustained from the successive empires that attained world domination. The faith of Israel sought comfort in the thought that the way of deliverance would be found in “the day of the Lord,” when God would break into human history and set up His Kingdom by a *tour de force*.

Apocalyptic can best be understood by contrasting the Greek and Jewish conceptions of Utopia. In Greek thought, especially in Plato, Utopia is to be realized by the natural evolution of social forces. To the Jews, on the other hand, the realization of Utopia was only possible through a divine intervention. Apocalyptic first took shape in the writings of Ezekiel, and found its fullest expression, as far as the Old Testament is concerned, in the Book of Daniel. In the subsequent period between 170 B.C. and A.D. 100 many Jewish Apocalypses were written, e.g. The Book of Enoch, which contains a number of Apocalypses of varying dates, The Book of the Secrets of Enoch, The Apocalypse of Baruch, The Ascension of Isaiah, The Assumption of Moses, and The Fourth Book of Ezra. The Book of Revelation represents an attempt to Christianise the Apocalyptic movement. Other attempts of a similar nature were also made, e.g. The Apocalypse of Peter, fragments of which were discovered in 1892. This was the source from which Dante derived much of his imagery for the Paradiso and Inferno.

Apocalyptic Number. The number 666, given as that of the Beast in Rev. 13, 18. It was applied by the early Christians to rulers who seemed like Antichrist such as Caligula and Nero, the letters of whose names, written in Hebrew, total 666. Alternatively

it stood for the Roman empire. Throughout history ingenious people have fitted the number to the names of their enemies.

Apocatastasis. Greek word meaning restoration to its first condition. It is applied to the theological doctrine that all mankind shall ultimately enjoy salvation, and that even devils and those accounted lost, having been created by God, shall return to God. Derived from Platonism, it was taught by Origen, Clement of Alexandria, and S. Gregory of Nyssa. It was attacked by S. Augustine and condemned at the Council of Constantinople, A.D. 553. The belief, as revived by various modern sects, is known as Universalism. See Universalists.

Apocrypha (Greek *apokryphos*, secret). A term applied first to writings which were kept secret because they were supposed to contain truths which might be imparted only to the duly initiated. Apocryphal then came to denote certain writings connected with, and growing out of, the Old and New Testaments, but of a different character from the books generally accepted as inspired or canonical. From this to the meaning spurious or heretical the transition was easy. In common speech the Apocrypha denotes the Old Testament Apocrypha.

The Apocrypha Proper are included in the Greek (Septuagint) and Latin (Vulgate) Versions, but not in the ordinary English Bible. The Church of Rome at the Council of Trent (1546) accepted them as “sacred and canonical.” The Protestant Churches rejected them, but some of the Reformed Churches, e.g. the Church of England, use them for purposes of edification.

The books, which are in some cases Palestinian and in others Hellenistic, may be classified thus: (a) *Additions to the Old Testament*: the remainder of the Book of Esther, the Prayer of Manasseh, three additions to Daniel, viz The Song of the Three Holy Children, The History of Susanna, and the Story of Bel and the Dragon. These are of the nature of legendary history or romance. (b) *Historical Works*: I Esdras, I and II Maccabees. (c) *Didactic Works*: The Wisdom of Solomon, the Book of Sirach (Ecclesiasticus). (d) *Religious Romances*: The Book of Tobit, the Book of Judith. (e) *Apocalyptic Works*: The Book of Baruch, II Esdras. There also exist a Third Book of Maccabees (in Septuagint, but not in Vulgate) and a Fourth Book of Maccabees (in Alexandrian MS. of Septuagint, but not in Vulgate). These are

romantic in character. The periods to which these works may be assigned are as follows: c. 200–100 B.C., Sirach, Tobit, Judith, Additions to Daniel; c. 100–1 B.C., I Maccabees, II Maccabees, III Maccabees, Book of Wisdom, I Esdras, Additions to Esther; c. A.D. 1–100, Baruch, II Esdras.

The Pseudepigrapha are a similar body of literature so described by scholars because many of them were written in the names of famous persons. This class of writing has been characterised as Apocalyptic Literature. The style of writing is prophetic and allegorical or symbolic. (See Apocalypse.)

The Apocrypha connected with the New Testament are not so well known. Nor are they so well defined as a collection of writings. Most of them are very fantastic. But there are some (the First Epistle of Clement, the Teaching of the Twelve Apostles or the Didache, the Epistle of Barnabas, the Shepherd of Hermas, the Gospel and the Apocalypse of Peter) which resemble more closely New Testament writings, and in fact were used for a time as Scripture by the Church; and there are others of such value (the fragmentary Gospel according to the Hebrews and Gospel according to Peter; the Logia or Sayings of Jesus) that they may be used to supplement the Gospel account of the life of Jesus.

The First Epistle of Clement was written (probably A.D. 95–8) to the Church at Corinth in the name of the Church of Rome, and was evoked by “an unholy and detestable sedition” in the Corinthian Church. It inculcates the virtues of unity and charity. The Teaching of the Apostles deals with (1) the general moral teaching of the early Church, and (2) the institutions of the Church. It has been dated as early as A.D. 70 or 80, but may be much later. The Epistle of Barnabas, described by Origen as the “Catholic Epistle of Barnabas,” is even included among N.T. books in the Sinaitic MS. The Epistle seems to be addressed to the Church as a whole. It deals with the attitude to be adopted towards the Jewish Law, which is interpreted allegorically. It can hardly have been written by the Apostle Barnabas, and may perhaps have originated about A.D. 130. The Shepherd of Hermas is another work included in the Sinaitic MS. It contains visions, commandments, and parables, and has been called the “Pilgrim’s Progress” of the early Church. In its present form it may have originated about A.D. 140. The

Gospel according to the Hebrews contains some interesting sayings. Harnack would assign it to a date between A.D. 65 and 100. The Gospel according to Peter is heretical, written to promote Docetism, which taught that the humanity of Christ was not real, but only apparent. It is assigned by Harnack to a date between A.D. 110 and 130, but it may be later. In recent years a number of papyri containing Logia or Sayings of Jesus have come to light. Some may be genuine.

The more legendary Apocrypha include Gospels (such as the Protevangelium of James, the Gospel of the Nativity of Mary, the History of Joseph the Carpenter, the Gospel of Thomas, the Gospel of Nicodemus); Acts (of Paul and Thecla, of Thomas); Epistles (such as the correspondence between Jesus and Abgarus, the Epistle of Paul to the Laodiceans); and Apocalypses (of Paul, of Peter).

Apocynaceae (Gr. *apo*, from; *kyōn*, dog). Extensive family of twining shrubs, and a few herbs. They are natives of tropical and temperate regions in both hemispheres. Their milky sap is usually poisonous or violently purgative. The leaves are opposite or in whorls; the flowers salver-shaped or bell-shaped. The five lobes of the corolla are oblique. The family comprises more than 180 genera and 900 species, including the well-known periwinkle (*Vinca*), oleander (*Nerium*), and dogbane (*Apocynum*).

Apodeictic (Gr. *apodeiktikos*, demonstrative). Name given by Aristotle to a proposition which is demonstrated by incontestable evidence. Kant applied the term somewhat differently, to a judgment which is necessary and universal, not the result of experience. See Logic.

Apoget (Greek *apo*, from; *gē*, earth). Astronomical term with two meanings. (1) Point in the moon's orbit farthest from the earth. (2) Position in which the sun, or any other body in the solar system, is farthest from the earth.

Apollinaire, GUILLAUME (1880-1918). French poet. He was the founder of cubist poetry, a reaction against symbolism and romanticism. Alcools (1913) recorded in kaleidoscopic series his subjective impressions of the twentieth-century world. In Calligrammes (1918) he experimented in a freer selection and arrangement of words, and even in their setting, e.g. a poem on rain was printed in the form of a

downpour. He died a victim of the influenza epidemic of 1918. His work was later acclaimed by the surrealists. Consult G. Apollinaire: *Choix de Poésies*, 1945.

Apollinarianism. A heresy originating with Apollinarius, bishop of Laodicea, in the 4th century A.D. Starting with the Platonic assumption that man includes a human body (Gr. *sōma*), a human or rational soul (*psychē*), and a human mind (*nous*), it taught that in the human nature of Christ the

of soda. They are beneficial in cases of diabetes. Discovered in 1851, the spring waters average a temperature of 94° F. This and other springs in Germany and Hungary are owned by a British company, which bottles the waters and sends them nearly all over the world. The supply was interrupted by each of the Great Wars.

Apollinarius OR APOLLINARIUS (d. c. A.D. 392). Founder of the Apollinarian heresy. Son of an Alexandrian rhetorician and a friend of Athanasius, he transformed the Gospels and canonical Epistles into dialogues in imitation of Plato, defended Christianity against Porphyry, and strenuously opposed Arianism. In 362 he was made bishop of Laodicea in Syria. His opposition to Arianism, which denied the complete divinity of Christ, led him, in effect, to deny the complete humanity of Christ, hence the heresy Apollinarianism.

Apollo. One of the greater deities of ancient Greece. The son of Zeus and Leto (Latona), he was born in Delos, Artemis being his twin sister. In Homer Apollo is not identified with the sun, but in later mythology becomes the sun god. From the earliest times, however, he is the god of disease who sends pestilences among men, and is also the healing god. Power to foretell the future was attributed to Apollo in an eminent degree. There were many oracular shrines or temples of Apollo, notably the famous oracle at Delphi (*g.v.*). Probably for his gift of prophecy he was the patron deity of states, and especially of colonies, no colony being founded except after consultation with the oracle. Apollo is always represented as a tall, handsome, beardless youth, holding in his hand a bow or lyre. As the supreme type of manly beauty, he was the patron deity of athletes. He was also worshipped at Rome.

Apollo Belvedere. Statue of Apollo discovered in 1503 in the ruins of Porto d'Anzio, the ancient Antium. It was acquired by Pope Julius II, who placed it in the Belvedere gallery of the Vatican. It lacked the left hand and right forearm, both of which were restored by Giovanni Angelo Montorsoli (1507-63). The statue is supposed to be a 1st century A.D. copy of the bronze original. Illus. p. 517.

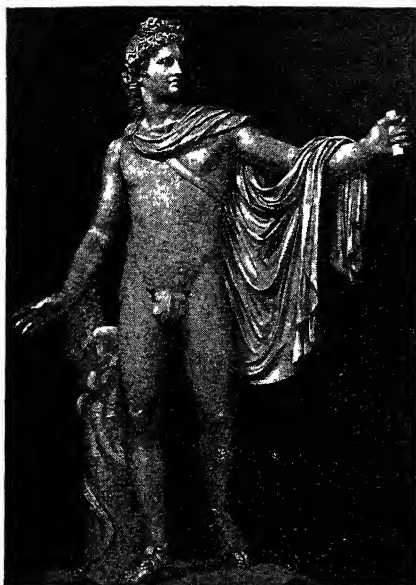
Apollo Club. Society founded by Ben Jonson about 1616 at the Devil Tavern; No. 2, Fleet Street, London. This famous inn was pulled down for the enlargement of Child's Bank in 1788. At the club's



Apollo. Ancient marble statue of the Greek god
Vatican, Rome

divine Word (Gr. *Logos*) took the place of the *nous*. It contended that to assume the complete humanity of Christ was to assume in His nature the possibility of sin and so to negative the Atonement. The heresy was condemned by the general Council of Constantinople, 381.

Apollinaris. Mineral spring of Germany, in the Rhine province. In the Ahr valley, 10 m. by rly. N.W. of Remagen, its waters are alkaline and contain carbonate



Apollo Belvedere, supposed to have been sculptured nearly two thousand years ago. See page 516
Vatican, Rome

lyric feasts there foregathered the wits of the day. A bust of Apollo and a board with the poetic Welcome are preserved at the bank. The rules, *Leges conviviales*, written in Latin by Jonson, bade the duldard, the ass, the sad-faced, and the lewd fellow keep away, and provided that "choice women" should not be excluded.

Apollo Theatre. Situated in Shaftesbury Avenue, London, this playhouse was opened Feb. 21, 1901, under the management of Henry Lowenfeld, with *The Belle of Bohemia*. Some of the greatest successes on the London stage were presented at the Apollo, including Pélissier's *Follies*, 1908; General John Regan, 1913; Hobson's *Choice*, 1916; *Idiot's Delight*, 1938.

Apollodorus (fl. c. 140 B.C.). Greek grammarian. He was a pupil of Aristarchus and the Stoic Panaetius. All his works have perished except his *Bibliotheca*, a well-arranged collection of stories connected with the mythical and heroic ages of Greece.

Apollonia. The name of numerous ancient cities. One in Illyria, near the mouth of the river Aous, was founded by emigrants from Corinth and Corcyra. Later it became a flourishing commercial town and the seat of a university at which Maecenas and the young Octavius were educated. Another, founded in Thrace by the Mile-

sians, was famed for its temple and its statue of Apollo by Calamis: this was removed to Rome by the art-patron Lucullus. Afterwards called Sozopolis, it is now known as Sozeboli. A third town, the modern Apollonia, was the harbour of Cirene, in Cyrenaica, 45 m. W. of Derna. In Gen. Auchinleck's offensive of Dec., 1941, the town was captured from the occupying Axis forces by British mobile columns. A few weeks later it fell again into the hands of Rommel's Axis forces, and in Nov., 1942, was finally liberated by the British 8th army advancing from El Alamein.

Apollonius of PERGA (c. 265-c. 200 B.C.). Greek mathematician belonging to the Alexandrian school. His systematic treatise on conic sections embodied all that was

previously known about them and immensely extended the knowledge of the ellipse, hyperbola and parabola. His books on these curves mention most of the properties found in modern text-books. He wrote also on regular solids, arithmetic, and the theory of the screw.

Apollonius of RHODES (c. 295-215 B.C.). Greek epic poet and grammarian. He was born at Alexandria, and was a pupil of Callimachus. Afterwards an enmity sprang up between the two poets, and when Apollonius read his *Argonautica* in public he found it coldly received owing to the intrigues of his rival. He then went to Rhodes, where the people received a revised version with great applause and bestowed upon him the rights of citizenship. Back in Alexandria he acquired great fame and popularity, and was appointed chief librarian by Ptolemy Euergetes. In his epic, which describes the voyage of the Argonauts in quest of the Golden Fleece, he strives to imitate the style of Homer. The poem was translated into Latin by Valerius Flaccus and Varro Atacinus.

Apollonius of TRALLES (2nd century B.C.). Greek sculptor. He is notable as having executed with the aid of his brother Tauriscus, the colossal marble group of Amphion and Zethus, known as the Farnese Bull. This group, in the National Museum, Naples, is

reputed to have been in Rome about the time of Pliny.

Apollonius of TYANA (c. 4 B.C.-A.D. 97). Greek Pythagorean philosopher. He was born at Tyana in Cappadocia, and travelled widely. In Rome he was accused of high treason against Domitian, but suddenly disappeared during his trial. He died at Ephesus while head of a Pythagorean school. Apollonius was looked upon as a magician, and wonderful tales are told of him in the story of his life by the sophist Philostratus, written in the 3rd century. His life and reputed miracles were compared with those of Christ.

Apollo. Name of an early convert to Christianity mentioned in the N.T. He was a Jew of Alexandria converted to Christianity by Aquila and Priscilla at Ephesus. Later, at Corinth, he preached the Gospel of Christ, and is mentioned by S. Paul as a fellow-worker whom faction had endeavoured to make a rival. *Consult Acts 18; 1 Cor. 1, 3, and 4.*

Apollyon. Greek term in the N.T. for the Hebrew Abaddon. It means the Destroyer (Rev. 9), and is so applied to the Devil by Bunyan in *The Pilgrim's Progress*.

Apologetics. That department of Christian theology which is entrusted with the defence of the Christian religion. Alike in theory and practice there has been infinite diversity in apologetic method, varied more in its forms than has the intellectual and literary crusade on behalf of the Christian faith. The latter has been from the start the subject of passionate contention. Not peace but a sword was the Founder's own metaphorical description of the purpose and result of His coming. He invited resistance and entailed upon His followers a legacy of struggle. An undercurrent of apologetic purpose runs through the N.T. not seldom rising to the surface. Apart from differences between leaders and parties in the swiftly growing church, missionary enterprise brought into the open the latent principles of external opposition, and by literature not less than preaching the resources of the new faith were developed.

The apologetic energies of Christianity have often resulted in the purifying of Christian faith, discipline, and practice. Dogma and piety are both indebted to the vision and experience gained by apologists through their warfare. Such questions as: What is the essence of our religion? What must be conserved at any

cost? What compromises would be disastrous? help to illuminate the path of constructive doctrine and of practical life.

In the first age Jewish, Greek, and Roman polemics were met by Clement of Alexandria, Tertullian, Origen, and Augustine. In the Middle Ages Judaism, Islam, and free-thinking philosophy were dealt with by Abélard and Aquinas. During and after the Reformation Islam and free-thought had still to be combated, as by Pascal. In the 18th century deism and scientific scepticism were met by Butler. In the 19th century attacks came on a far more comprehensive scale, but in Britain were defenders like James Martineau, Robert Flint, A. M. Fairbairn, and J. R. Illingworth, who carried the war into the very strongholds of antagonistic thought.

As the result of modern apologetic activity, a revolution has been effected in our conception of religious values. Alternatives to the Christian system have been faced. The spread of education, the diffusion of literature missionary enterprise, the encroachment of secular interests, have helped to bring about an increase in the sense of Christian and indeed religious solidarity, a weakening of sectarian animus, a growth of the power to visualise the issues raised. The battle for religion has drawn out into the open every form of spiritual activity; atheism, agnosticism, and materialism stand out as a common menace to the faiths. Apologetics accordingly has refused to hazard all upon the historicity of particular miracles, upon the inerrancy of particular Scriptures, upon an absolute differentiation between the natural and the revealed, the natural and the supernatural, the human and the Divine. Stress is laid upon continuity of faith in the unseen. Christianity is viewed as a system or ideal of life, involving the doctrine revealed by Christ but equally the life disclosed by Him and developed by His Spirit. Truth is recognized and even welcomed in rival religions. In the life and teaching of Jesus a self-commending ideal of life and thought is found, supreme in grandeur and simplicity, universal and final. *See* Christianity.

Apologia pro Vita Sua (La. Apology for his own life). Work by John Henry (afterwards Cardinal) Newman, first published in 1864. The work, provoked by a statement of Kingsley's challenging

Newman's regard for truth, is the best example of the author's prose. In it he traced the way in which he passed from the Anglican to the Roman Catholic Church, and told much of the story of the Oxford Movement (*q.v.*).

The book had an immediate success, its obvious sincerity and frankness disarming opponents and winning for its author an esteem with the British public he had not hitherto enjoyed. While the provocation has been relatively forgotten, the *Apologia* remains one of the permanently valuable autobiographies of the world. *See* Newman, John Henry.

Apologue (Gr. *apologos*, tale). Short story in which animals, trees, etc., are used as characters, from whose doings a moral is deduced. A celebrated apologue is that of the trees called upon to choose a king (Judges 9), while another, of the bee and the spider, is to be found in the early part of Swift's *Battle of the Books*. A classic example is the fable of the Belly and its Members put into the mouth of Menenius Agrippa, the patrician, in his speech to the plebeians, by Livy. The apologue closely resembles the fable, though it is generally less definitely a story; and, less closely, the parable.

Apology. Word derived from the Greek, meaning to take back speech (*logos*). In English law (Libel Act, 1843) a defendant in an action for libel may in certain cases apologise and plead the apology as a defence or in mitigation of damages. By the same Act a newspaper defendant in such an action may plead an apology and pay money into court as amends. If the plaintiff does not accept the amount so paid in, and the jury award him not more than that amount, judgement will be for the defendant with costs. Since 1934 a defendant in an action of libel or slander has been able, like defendants in other actions, to pay money into court with a denial of liability, and, in consequence, newspapers rarely avail themselves of the Libel Act. *See* Libel.

In literature the word is used to mean rather a plea for a person or thing. In this sense it is employed by Plato in his *Apology* for Socrates at his trial; by Sir Philip Sidney in his *Apologie* for Poetrie, c. 1581; by Thomas Heywood in his *Apology* for Actors, 1612; and by other writers.

Apophthegm (Gr. *apo*, forth *phthengesthai*, to speak). A terse, sententious expression of philosophic thought, *e.g.* Cowards die many

times before their deaths; the valiant never taste of death but once. *Pron.* App'-ōth-em.

Apoplexy (Greek *apo*, from; *plēssein*, to strike). Condition of sudden loss of consciousness and sensation due most frequently to the bursting of a blood-vessel in the brain. It is often referred to as an apoplectic stroke. Apoplexy is commoner in men than in women, and occurs often after the fiftieth year of life. Syphilis, alcoholism, and heavy muscular work are predisposing factors. The attack is usually without previous warning symptoms, and occurs while the patient is engaged in his ordinary occupations, though sometimes it is precipitated by extra exertion.

In a typical attack there is deep unconsciousness and the patient may fall heavily to the ground; the face may be flushed or pale or bluish; the pupils may be unequal; often the head and eyes are turned towards the damaged side of the brain. The breathing is noisy and laboured, the cheeks being puffed out during expiration and frothy saliva collecting about the mouth. The pulse is full and tense and often slow. In some cases the onset is less abrupt. In moderate attacks consciousness gradually returns, but in severe forms the condition may persist and end in death in a few hours.

Paralysis is a frequent result of an apoplectic stroke. Sometimes the whole of one side of the body is involved, a condition known as hemiplegia, in other cases only the face, arm, or leg of one side is affected. Impairment of speech with various forms of aphasia is common. With the passage of time considerable power of movement may be regained in the paralysed muscles, but complete recovery, except in mild cases, is rare.

The treatment during an attack is to keep the patient absolutely at rest with the head slightly raised. Hot bottles may be placed at the feet and an ice-bag applied to the head. In some cases venesection or blood-letting has been useful, but little can be done to relieve the paralysis. A person who has once had an attack should lead an ordered restful life, avoiding alcohol, over-eating, and severe muscular effort.

Aposiopesis (Gr. *aposiopaino*, to become silent). A rhetorical figure in which a speaker breaks off in the middle of what he is saying, impressing the imagination of the hearer by what is left unexpressed. It is often used to convey a threat.

Apostasy (Greek *apo*, away; *stasis*, standing). Term originally meaning the desertion of a military post. Its later and general application is to the complete and voluntary renunciation of the Christian faith, either in favour of another religion or of none. The persecution of the 3rd century under the Roman Empire induced a considerable apostasy, and in the Middle Ages in Spain many abandoned Christianity to become Jews and Mahomedans. The apostate always incurred heavy ecclesiastical penalties. The rejection of Christianity in favour of paganism by the emperor Julian is a most remarkable instance of apostasy.

Apostle (Gr. *apo*, from; *stellein*, to send). Term meaning "one sent forth," and so a commissioned delegate or messenger. The name is applied specially to the twelve followers selected by Jesus to be His close and constant companions and to carry on His work after His departure (*cf.* Matt. xxviii, 16-20). These were Simon, also called Peter; Andrew; James and John the sons of Zebedee; Philip, Bartholomew, Thomas, Matthew; James the son of Alphaeus; Thaddaeus; Simon the Canaanite or Zealot; and Judas Iscariot (Matt. x, 2-4; *cf.* Mark iii, 16-19; Luke vi, 14-16; Acts i, 13). Later Jesus appointed seventy others and commissioned them (Luke x, 1). These He sent forth "two and two before his face into every city and place whither he himself was about to come." According to tradition, one of them was Barnabas; and according to Origen, Andronicus and Junias may have been included in the number. In any case the title was extended for one reason or another to Barnabas (Acts xiv, 4, 14; 1 Cor. ix, 5-6). Paul applied the title to himself, and claimed by virtue of a direct revelation from Christ to himself to rank with the chosen apostles (Gal. i, 1, ii, 8; 1 Cor. i, 17, xv, 8-10, etc.). There were others, false teachers, who assumed the name to further their own ends (2 Cor. xi, 5, 13; Rev. ii, 2). In later times the term apostle has been applied to missionary founders of the Christian Church in various lands. *e.g.* S. Augustine, apostle of the English, S. Patrick of the Irish, and S. Boniface, the apostle of Germany. See Christianity.

Apostle Islands. Group of 27 isles in Lake Superior, belonging to Wisconsin, U.S.A. They produce valuable timber, possess brown sandstone quarries, and contain several Jesuit mission stations and an Indian reservation. The area is about 200 sq. m.

Apostles, THE. Oratorio by Sir Edward Elgar. Shortly after his completion of *The Dream of Gerontius* (*q.v.*) the composer planned a sequence of three oratorios to be based on the lives and works of the apostles. This trilogy was never completed. The first section, known as *The Apostles*, Parts 1 and 2, was performed under the direction of Richter on Oct. 14, 1903, at the Birmingham Festival. The words Parts 1 and 2 were omitted from later editions because the next section was separately entitled *The Kingdom* (*q.v.*). The text of *The Apostles* is taken from the Bible; the narrative follows the N.T. story from the beginning of Christ's ministry to His death, resurrection, and ascension.

Apostles' Creed (Latin *credo*, I believe). Confession of the Christian faith, stating in short articles the fundamental doctrines of Christianity. The earliest form of this creed was a profession of faith in the Holy Trinity required at baptism. In the 2nd century Irenaeus and Tertullian quoted a number of items set out in the old Roman creed; later testimony comes from Hilary, S. Augustine, and Leo the Great, and by the 7th century the Apostles' Creed in its present form was in use at Rome and in southern Gaul. The additions to the old Roman creed are Creator of heaven and earth, He descended into hell, the communion of saints, life everlasting, and the word Catholic—Holy Catholic Church superseding Holy Church.

The Apostles' Creed has been continuously retained in the baptismal service of the Catholic Church since the 7th century, and is part of the order of baptism in the Roman ritual and of the baptismal service of the Book of Common Prayer. It is also recited daily in the morning and evening offices of the Roman Breviary and the Anglican Prayer Book. The Council of Trent endorsed its authority as an essential statement of Catholic belief, and it is required to be believed in the Church of England. The tradition of the Middle Ages, dating from the 6th century, that the twelve Apostles drew up a creed and that this creed was that taught by the Fathers, is without historical foundation. The title Apostles' Creed is so given because the belief expressed is the faith of united Christendom from the days of the Apostles. *Consult* Apostles' Creed, H. B. Swete, 3rd ed., 1899; The Apostles' Creed, A. C. MacGiffert, 1902; The History of the Creeds, F. J. Badcock, 2nd ed., 1938.

Apostle Spoon. Spoon bearing on it the figure of an apostle. Such spoons were usually made in sets of thirteen, each handle terminating in the figure of an apostle except the thirteenth, which bore the figure of Christ. In the 16th century, when a child was baptized the custom was to give it one of these spoons bearing the figure



Apostle Spoon. Examples of the only known complete set, 1626

Goldsmiths' Company, London

of the child's patron saint. Old specimens are very valuable.

Apostoles. Town of Argentina, in Misiones Territory. It is on the North-Eastern Rly., 35 m. S. of its terminus at Posadas. Founded in 1638 by Jesuit missionaries, in a fertile region, it has interesting architectural remains, picturesque surroundings, and also a healthy climate.

Apostolic Acts. Works or Acts in the N.T. Apocrypha, professing to give further details concerning the lives and histories of the Apostles. Their apocryphal character is indicated by the extravagance of their narratives as compared with the general simplicity of the N.T. records. Some of the Acts are the product of a pious fantasy; others were composed in the interest of some heresy. Among the earlier of these writings are the *Acta Andreæ* (Acts of Andrew), the *Acta Thomæ* (Acts of Thomas), and the *Acta Joannis* (Acts of John). The last-named was popular among the Manicheans and certain Gnostics. There are also Acts of Peter and Paul, of Paul and Thecla, of Barnabas, of Philip, of Thaddaeus, and of others. See Apocrypha.

Apostolic Brethren. Name applied to a sect that arose in Syria and Asia Minor in the 2nd century. They denounced flesh-eating, private property, and marriage, on the ground that these things were a departure from apostolic custom. They became identified with the Manicheans. Societies bearing the name of Apostolici, and reviving the teaching of the earlier Apostolic Brethren, arose in the 12th and 13th centuries in Germany and Italy.

Apostolic Constitutions. Collection of eight books, laying down rules for the conduct of Christians, the order of services, the administration of the Sacraments, and the authority of the clergy. Ascribed

by the compilers to a Clement of Rome, they probably date from the latter half of the 3rd or the early part of the 4th century. The first six books are derived from the Didascalia of the Apostles, a lost treatise of the 3rd century, found in Syriac versions, while the seventh book is based on the Didachē of the Twelve Apostles, a 2nd century work rediscovered in 1873. The eighth book can be traced to a number of sources. The apostolic constitutions were unknown in the Western Church in the Middle Ages and were published in 1563 for the first time in Latin and Greek.

Apostolic Fathers. The name used to distinguish those disciples and contemporaries of the Apostles who wrote in the cause of Christianity. They include Clement, bishop of Rome, believed to be the Clemens referred to by S. Paul (Phil. 4), to whom two epistles are ascribed, only one of which is his; Ignatius, bishop of Antioch, seven of the twelve epistles attributed to whom are regarded as genuine; Polycarp, bishop of Smyrna, author of an epistle to the Philipians; Hermas, to whom the work known as The Shepherd of Hermas is doubtfully assigned; Barnabas, whose name is given to an anti-Jewish epistle thought to have been written by a converted Alexandrian Jew, not the companion of S. Paul; and Papias, a contemporary of Polycarp and Ignatius, whose writings exist in fragments.

Apostolic Majesty. The title borne by the emperors of Austria in their capacity as kings of Hungary. Pope Sylvester II gave it to S. Stephen, the first Christian king of that country, about 1000, and Clement XIII confirmed it when the empress Maria Theresa was "king" of Hungary. It lapsed with other royal titles in 1918.

Apostolic Succession. Name for the doctrine that the mission given to the Apostles by Christ (John 20; Matt. 27) must extend to their legitimate successors in an unbroken line until the end of the world. The Roman Catholic interpretation of this doctrine (held also by the High Anglican school) is that the method of preserving the succession and thereby preserving the Apostolic faith is through the episcopate alone; the Apostles having laid their hands on their successors, who in turn ordained other bishops. It thus follows that only those clergy ordained by bishops of the succession have the Apostolic power, the authority to celebrate the Eucharist and to give absolution to the penitent.

Protestants and Nonconformists. on the other hand, generally maintain that the succession not only does not depend on episcopal ordination, but that such a succession does not exist, the Apostolic faith having been preserved by the written word of the N.T. and legitimate successors to the Apostolic ministry raised up from time to time as S. Paul was. While Apostolic succession is to Roman Catholics, and to many members of the Church of England, a guarantee of the validity of their sacraments and the assurance of a duly commissioned ministry, neither such guarantee nor assurance is of recognized importance to Protestant Nonconformists. See Anglicanism; Roman Catholic Church.

Apostrophe (Greek *apo*, from; *strophē*, turning). A rhetorical figure. If a speaker interrupts his general discourse to address a particular individual, or sometimes a person or personification as though present, this is called an apostrophe. In the former sense Jesus apostrophised Peter (Luke 22); in the latter sense the figure is frequently employed in poetry and in impassioned prose. Thus, in Scott's Marmion (canto vi), the story is interrupted by the apostrophic "O woman, in our hours of ease."

In punctuation, an apostrophe is the mark ', used to denote the omission of a letter or figure; e.g. o'er for over, '46 for the year 1946. It is obligatory for showing the possessive case, as in the boy's, or several boys' (except in the word its); here the omission was originally of the letter e. A minor use is in forming the plural of a letter or figure, e.g. P's and Q's, all the 8's, though this is not accepted as sound by all authorities. There are still variations in practice, for whereas most would write can't for cannot, Lewis Carroll used can't, and Bernard Shaw used cant, likewise I'm and they're. In printed prose there is little excuse for can't and its like, except in quoted speech or in making use of such established phrases as "It's an ill wind," etc. The apostrophe is valuable in poetry for showing scansion; thus, winged might be two syllables, but wing'd must be one.

Apothecaries of London. WORSHIPFUL SOCIETY OF. Corporation in London, which has power to license medical practitioners and dispensers. Its charter dates from 1617, before which it was united with the Grocers' Company. Its early duties were to examine and license assistants to apothecaries,

but since 1815 it has also conducted examinations for intending medical men, who could then



Apothecaries' arms

practise in England and Wales. By the Medical Act, 1858, it can appoint a member on the General Medical Council and confer the degree of licentiate. Under the Apothecaries Act, 1907, it can grant the diploma of Licentiate in Medical Surgery—L.M.S.S.A. (London). The society is a city livery company. Consult The London Apothecaries, Their Society and Their Hall, C. Wall, 1932.

Apothecaries' Hall. In Black Friars Lane, Queen Victoria Street, London, E.C.4. It was rebuilt in 1678 after the Fire of London. The monthly examinations of candidates seeking the licence, L.M.S.S.A., are held here. The premises consist of a great hall, court room, and library, panelled in oak of the Wren period. There is some interesting stained glass, and a fine collection of furniture, plate, and pictures, the latter including two portraits of James I, founder of the Society of Apothecaries. The minutes are complete from 1617; and the library contains many ancient herbals and other valuable books. Laboratories were attached to the hall in 1671.

Apothecaries' Measure and Weight. Used in prescribing and dispensing medicines. Solids are weighed, and liquids are measured. The units are the grain, scruple, drachm, ounce, and pound for weights, though the custom is to use only the first three for prescribing; quantities of solids above the drachm are presumed to be weighed by avoirdupois weight. In apothecaries' weight a pound consists of 12 oz. of 480 grains; whereas the avoirdupois pound is equivalent to 16 oz. of 437½ grains. The units in apothecaries' measure are the minim, fluid drachm, fluid ounce, pint, and gallon. In prescribing liquids, quantities up to an ounce are measured by the apothecaries' scale; for larger quantities, imperial measure is used.

Apothecary (Greek *apothēkē*, store). One who mixes drugs. The art of mixing drugs for medicinal purposes and of prescribing and administering them is of ancient origin, and those who practised it were recognized as a distinct class as early as the 12th century. At

first they were associated in London with traders with the East in spices and drugs, known as pepperers and spicers of Cheap (Cheapside). Later they became incorporated with the grocers, but retained their special title of apothecaries and practised as such. They were the forerunners of the medical practitioners of today.

Apotheosis (Gr. *apo*, apart. *theos*, god). Elevation of human beings to the rank of gods. The practice existed among most ancient peoples—Egyptians, Assyrians, Greeks, and Romans. Among the Greeks its earliest form was the semi-deification as heroes of distinguished warriors and founders of colonies. After the 5th century B.C. full divine honours came to be bestowed upon rulers and generals even during their lifetime. In memory of Julius Caesar, divine honours were decreed him after his death with the title of *divus*. After this it became the usual custom for the ruling emperor to propose to the senate that his predecessor should be deified (*consecratio*). Empresses also could share the honour.

Appalachians. Mountain system of the E. United States. It stretches in a series of parallel ridges and valleys from Georgia to Maine, gradually approaching the Atlantic coast. The whole area has been sculptured by almost every type of destructive force, so that its geological history is complex; but in general it consists of an eastern and a western ridge, with a trough between. The western ridge—the Allegheny Mts. or Escarpment, including the Catskills at its N. end—is the eastern face of the Appalachian plateau which slopes gently down to the Mississippi valley. The eastern ridge—the Blue Ridge—rises sharply from the Atlantic coastal lowlands. Between these two ridges the Great Appalachian Valley forms a trough with a diversified floor; it varies in elevation from 400 to 2,000 ft. This general description does not apply to the north-east; the trough is continued by the valley of the Hudson river and the Lake Champlain depression, and the eastern ridge is replaced by the Shickshock, Green, and White mts.; the western ridge stops at the Mohawk river, and thus the Adirondacks resemble the Green Mts., etc., in being chiefly sculptured by glaciers. The Black Mts., which culminate in Mt. Mitchell, 6,711 ft., form the highest part of the eastern ridge.

The rivers Delaware, Susquehanna, Potomac, and James rise in the western plateau and reach the Atlantic.

Historically, the Appalachians have been of supreme importance. The Hudson-Mohawk-Champlain depression is the only easy, natural way through the barrier,

mineral resources, such as the anthracite of Pennsylvania.

Appalachian Way. Great U.S. highway nearly 1,000 m. in length running S.E. from Chicago, Illinois to the Atlantic coast at Charleston, S. Carolina, *via* the beautiful scenery of the Cumberland Mt., Clinch Mt., and Black Mt. ranges.

Apparition (Lat. *apparere*, to appear). Word meaning literally a thing seen. It is used to define (1) a ghost; (2) in pathology, a visual hallucination, as in the case of the sick or insane; (3) in astronomy, a body's first appearance after occultation.

Belief in apparitions is found in all ages and races, notably in the idea that the soul, spirit, or eidolon revisits the body or the grave of the body after death; it has received an impetus by the growth of spiritualism, clairvoyance, and experimental telepathy. Scientists assign apparitions to purely physiological causes, but, apart from the more or less traditional instances of apparitions recorded in history, the many cases in which persons in normal health have testified to seeing apparitions of departed relatives or friends, or of living persons known to have been at a distance at the time, keep the problem open. See Spiritualism; Telepathy.

Apparitor. Officer of the English ecclesiastical court whose duty it is to summon a defendant. The term is also used by some colleges and other institutions as an alternative to beadle or herald. In Rome an apparitor was the executive attendant of a magistrate.

Appassionata (Ital.). Musical term, meaning with intense feeling. Beethoven's sonata in F minor, op. 57, is known as the *Appassionata*.

Appeal, Courts or (Lat. *appellare*, to call upon). Courts of law in which, if desired, the decisions of lower courts are reviewed and, if necessary, reversed. Every modern system of administering justice provides a right of appeal, subject to certain limitations, for dissatisfied litigants.

In England there is a court of appeal manned by lords justices, in which are heard appeals from the Chancery, King's Bench, and Probate, Divorce and Admiralty Divisions of the High Court of Justice, County Courts, and certain other courts and judicial bodies, e.g. bankruptcy officials. From this court there is the right of appeal with leave to the House of Lords, which, as a court of justice, consists of peers of high legal



and this fact accounts for the localisation largely to the neighbourhood of this route of the struggle between France and England for the American colonies and of the War of American Independence. Across the barrier farther south the tortuous routes from valley to valley made communication from the coastal plain to the Ohio valley very difficult. The steady progress of the people has chiefly depended upon the construction, first, of national highways and, later, of great railways across the barrier, and upon the exploitation of the

attainments. In Scotland the inner house of the Court of Session is the court of appeal to which cases from the outer house are taken. Northern Ireland has a court of appeal on the English model. From these two there is a further and final appeal to the House of Lords. These courts deal only with civil cases, but for criminal cases England has a court of criminal appeal established in 1907; this consists of the Lord Chief Justice and some judges of the King's Bench Division. From the lower courts there is also the right of appeal. From courts of summary jurisdiction cases can go to quarter sessions, and from quarter sessions (on legal points) to a divisional court, composed of judges of the High Court. There is a like sequence in Scotland and Northern Ireland. A court of criminal appeal was established for Scotland in 1926.

Canada and Australia, being federal governments, have each a court of appeal to which cases from the provincial courts are referred: the various provinces have also their courts of appeal, though not necessarily called by that name. From the supreme courts in Canada and Australia, and also from those in South Africa, New Zealand, and other parts of the British Commonwealth, the final court of appeal is the Judicial Committee of the Privy Council; but in 1949 Canada introduced legislation to end this. The Committee is also the supreme court for ecclesiastical cases and cases under the Naval Prize Acts.

Most foreign countries have courts of appeal graded in somewhat similar fashion. The U.S.A. has a Supreme Court. France has a court of cassation for civil cases and another for criminal cases.

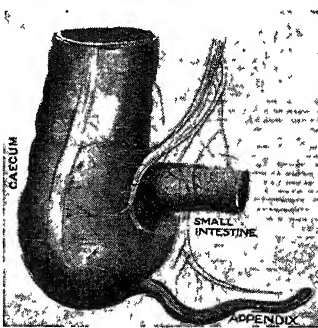
The principle of the appeal, although sometimes abused, is thoroughly equitable, and gives the litigant every chance of obtaining justice. In England, as a rule, appeals will only be against a decision or ruling that is wrong in law; but the Courts of Appeal will also reverse a decision where there has been a palpable mis-trial on the facts, e.g. where the verdict of a jury is "perverse," or such as no reasonable body could have given on the evidence; and the court of criminal appeal can amend a sentence or quash a verdict on the ground of judicial misdirection to the jury.

Appearance. A term used in English law. Proceedings in the High Court of Justice are begun by a writ or an originating summons,

which is served personally on the defendant or on his solicitor. The defendant, if he wishes to defend the action, must file, at the appropriate office in the High Court, a paper which says, "Enter an appearance for the above-named A.N. (defendant)," and must serve a copy on the plaintiff or his solicitor. This is the appearance.

Appellants. Name given in 1387 to Thomas, duke of Gloucester, Richard, earl of Arundel, Thomas Beauchamp, earl of Warwick, Henry, earl of Derby, afterwards King Henry IV, and Thomas Mowbray, earl of Nottingham. In a manifesto issued at Waltham on Nov. 14, 1387, they "appealed" of treason five of Richard II's friends.

Both the king's friends and his enemies collected troops; at Radcot Bridge, in Oxfordshire, the former were routed, and the appellants were masters of the land. They ruled England for over a year;



Appendix, or vermiform appendix, showing its position at the base of the caecum

they and their friends secured the great offices of state, while their foes were put to death without mercy. In May, 1389, Richard II regained control of the government, but it was not until 1397 that he felt strong enough to punish the appellants. In August they in their turn were "appealed" of treason by eight appellants—friends of the king. Gloucester was murdered in prison at Calais, Arundel and Warwick were tried and executed, while Derby fled the country, soon to return and supplant Richard on the throne. Mowbray had gone over to the king's side, and was rewarded with the title of duke of Norfolk. Consult Constitutional History, W. Stubbs, Vol. iii, 5th ed., 1903.

Appendant (Lat. *ad*, to; *pendere*, to hang). English legal term. Where a right of property, of an accessory kind, is attached to another, so as to be enjoyed with it, it is described as appendant or appurtenant. It is appendant only if it was acquired by prescription—

that is, by enjoyment from beyond the time of legal memory (Richard I). If acquired in any other way it is appurtenant. Thus, A. B., as a freehold tenant of a manor, will probably have as appendants to his freehold certain rights of common—estovers, botes, piscary. These pass with A. B.'s freehold, and are inseparable from it. See Appurtenant: Land and Land Laws.

Appendicitis. Inflammation of the vermiform appendix, a small blind prolongation of the caecum. Acute appendicitis is more common in the child; chronic appendicitis in the adult. The appendix may be infected by organisms present in the bowel or carried to it by the blood stream, bacillus coli, streptococci, and staphylococci being the commonest. Foreign bodies are an infrequent cause. The commonest of all causes is a concretion of dried faecal matter impacted in the lumen.

In acute appendicitis the onset is sudden with severe pain and possibly vomiting and collapse. The pain, especially in children, is mostly round the umbilicus, before it settles in the right side of the lower part of the abdomen. The slightly varying position of the appendix makes this pain uncertain in degree and place. Temperature and pulse-rate rise. Persistent vomiting is common. Diarrhoea may be present and may give way to constipation. Tenderness and pain are present over the right rectus muscle, which is rigid. Appendicitis is much the commonest of the acute inflammatory conditions of the abdomen in those who are under middle age. Early operation is the right treatment. The condition if left alone may recover, but the patient has a greater liability to subsequent attacks. At any stage operation is equally indicated.

In chronic appendicitis the diagnosis rests on the history of sub-acute attacks. A diseased appendix may give rise to gastric symptoms which are unrelieved by food and are made worse by fatigue. It is an important point in diagnosis that dietetic treatment is of no help. Recovery follows the removal of the appendix, but this recovery may take some time.

A purge should never be given in the presence of abdominal pain until the cause is proved not to be appendicitis. When modern surgery and asepsis are considered, danger lies not so much in removing the appendix as in leaving it possibly to become gangrenous and cause peritonitis.



Appendix (Lat. *ad*, to; *pendere*, to hang). Word used in two senses: (1) of books and official reports, to indicate additional matter. This is in the shape of documents explanatory of, or supplementary to, the ordered statement contained in the main body of the work. It is either placed at the end or issued in a separate volume or volumes, e.g. an appendix to an encyclopedia. (2) In anatomy, the vermiform appendix, a small blind prolongation of the caecum or large intestine, illustrated on p. 522. See Appendicitis.

Appenzell. Canton of N.E. Switzerland. It was made from the possessions of the abbots of St. Gall, its name coming from Latin *abbatis cella* (abbot's cell). The canton of St. Gall surrounds it. An Alpine district, its highest point is Mt. Sents, 8,210 ft. It was divided in 1597 into Inner Rhodes, chiefly populated by Roman Catholics and consisting mostly of pasture land, and Outer Rhodes, largely Protestant, densely peopled, constituting the industrial portion. The former has an area of 67 sq. m. and the latter 94 sq. m. Both use the German tongue, and each retains its primitive democratic annual assemblies. The canton has muslin and cotton industries, and is noted for its goats' whey cure. Appenzell is the capital, but Herisau is the largest town. Freed from the abbots' rule in 1405, in 1411 Appenzell obtained the protection, and in 1452 became the ally, of the Swiss Confederation, of which it received full membership in 1513. Pop. Inner Rhodes, 13,383; Outer Rhodes, 44,756.

Apperception (Latin *ad*, to; *percipere*, to perceive). In general, becoming aware of something by active, conscious thought as opposed to passive sense perception. Leibniz first introduced

the term for clear ideas as distinguished from vague perceptions; Kant insisted upon the spontaneity of the mental activity, as something not derived from experience. Herbert regarded apperception as the appropriation and elaboration of new (apperceived) ideas by older (apperceiving) ideas; mind is the resultant of the effects of the apperceiving and apperceived "masses." According to Wundt, apperception is the apprehension of an idea by attention. Comparing the act of consciousness to an internal act of vision, he distinguishes the vaguer "field" of vision from the clearly marked "point" of vision. Apperception is the entrance of an idea into the point of vision, perception its entry into the field of vision. See Metaphysics.

Apperley, CHARLES JAMES (c. 1778-1843). Writer on sport under the pseudonym of Nimrod. Born at Plasgronow, Denbighshire, and educated at Rugby, he wrote first for *The Sporting Magazine* and afterwards for *The Sporting Review*. His chief publications are: *Nimrod's Hunting Tours, 1835*; *The Chace, the Turf and the Road, 1837*; *Memoirs of the Life of the late John Mytton, Esq., 1837*; and *The Life of a Sportsman, 1842*. The first editions of these works, with illustrations (hand coloured) by Alken and other artists, are very scarce. Apperley died in Pimlico, May 19.

1843. *Consult Life and Times of "The Druid."* F. C. Lawley, 1895; *Kings of the Hunting Field*, W. W. Dixon, 1899.

Appetite (Latin *ad*, to; *petere*, to seek). Desire or relish for food. Disorders of appetite may be diminished desire for food, increased desire, and perverted appetite. Diminished appetite can be caused by absence of vitamin B. This can be replaced by taking brewer's



Appian Way. Upper, reconstruction of the road leading to Rome as laid down in 312 B.C. Lower, the Appian Way today, trees growing among the tombs which once so thickly bordered it. See p. 524

yeast. Increase of appetite is often observed in convalescence from acute illness, such as typhoid fever, after the stomach has been long inactive, and in conditions such as diabetes, where there is an abnormal drain of nutritive material from the system. Unnatural appetite can be a manifestation of mental disorder, and may occur in pregnancy. See Diet.

Appian (Gr. *Appianos*). Roman historian. Born at Alexandria, he flourished in the middle of the 2nd century A.D. He practised as an advocate in Rome and was afterwards administrator of finance in Egypt. His *Romaica* or *Roman History*, written in Greek in 24 books, of which only 11 are completely preserved, describes in sections the history of various peoples until their incorporation in the empire. The account of the civil wars of Rome is the most important and is based on authorities no longer available. The work is uncritical and inaccurate; the narrative is clear, though uninspiring. Eng. tr., H. White, new ed. 1912.

Appian Way. A highway of ancient Rome. It separated the twelfth from the second and first districts, and was begun by the censor Appius Claudius in 312 B.C. Issuing from the Appian Gate, it proceeded through Latium, Campania, Samnium, and Apulia to the port of Brundisium, the modern Brindisi. It was thus the highway to the East. Remains of tombs and other ruins are still to be seen on that part of the ancient road which still stretches from the Porta Capuana (mostly a medieval structure) for about 5 m. into the open country. The New Appian Way is an entirely modern road, running from the Porta San Giovanni almost parallel with the old one, and continuing to Naples. This was the "Route 6" of the Allied advance upon Rome in May-June, 1944.

Appin. Mountainous district of Argyllshire, Scotland. It is bounded E. by Glencoe and W. by Loch Linnhe. The highest

point is Ben Vair (3,362 ft.). Port Appin is a port of call for steamers.

Appin Murder. Name given to the murder of Colin Campbell of Glenure, May 14, 1752. Alan Breck Stewart—the Alan Breck of Stevenson's Kidnapped and Catriona—a deserter from the English army, was indicted for the murder, and James Stewart as an accomplice. Breck, against whom there was no evidence, fled to France. Stewart, though a rebel of 1715 and 1745, was on good terms with Campbell, and had been pardoned. Campbell was the factor of the confiscated estates of the Stewarts, but James Stewart had been allowed to administer the property. He was arrested for the murder, tried by a jury of Campbells at Inveraray, Sept. 21-25, 1752, and hanged. There is no reason to suppose Stewart had any knowledge of the murder, and this execution was ordered to impress the still disaffected areas. The real murderer is unknown.

APPLE: THE FRUIT AND ITS GROWTH

H. H. Thomas, Editor of Popular Gardening, 1907-47

Describing Great Britain's most widely cultivated fruit and the way it is grown. Similar articles describe the Pear, Plum, Strawberry, and other fruits. See also Cider; Fruit; Orchard, etc.

The apple is the fruit most widely cultivated in the gardens and orchards of Great Britain. A fruit census taken by the ministry of Agriculture in 1944 showed that 15,223,700 apple trees, excluding cider apples, were under cultivation in Gt. Britain; of these more than 9,000,000 were dessert varieties and over 6,000,000 were cooking apples. This total does not include the numerous trees in amateurs' gardens.

The excellent apples now available to planters are descendants of the crab; throughout many generations new varieties have been raised from seed. Some of the seedlings were raised by artificial cross-fertilisation of the blossoms of chosen varieties, others merely by saving the pips from the best apples available at the time, and sowing them. As a result of these processes, carried out during many years, hundreds of varieties of apples have been raised, though only a limited number are in general cultivation.

Much valuable work has been done in renovating neglected British orchards and in bringing the trees into a fruitful condition. Experiments by horticultural-research workers have been of the greatest help to fruit growers in providing information as to the

best stocks for the trees, in classifying apples according to whether they are self-sterile or self-fertile, and in the best methods of controlling the pests and diseases of fruit trees by the use of new types of insecticide and fungicide. These matters, together with improved methods of grading and packing, have enabled growers to keep abreast of the times and have resulted in the marketing of better produce. Home-grown apples are plentiful from August until early in the New Year, but late varieties which will keep in good condition are still needed. Large quantities of apples are imported, for the home-grown supply does not meet the demand.

The stocks on which apples are budded or grafted influence the growth of the trees and determine the period which must elapse before fruit-bearing begins. Standard trees, budded on the crab stock, are not likely to bear good crops in less than 10 years. They have a 6 ft. stem clear of branches, live to a great age, and when mature yield heavy crops. They are more suitable for orchards and large gardens than the small gardens of amateurs. The half standard, which has a clear stem of about 4 ft., is to be preferred for small gardens.

For general planting in gardens the most profitable type of tree is the bush apple; it has no main stem but consists of a number of branches which arise from near the base of the tree. It is generally budded on the broad-leaf paradise stock or Malling No. 1, comes into fruit-bearing in from 3 to 5 years, and continues profitable for an indefinite period. Trees budded on the Jaune de Metz or Malling No. IX stock are less vigorous, can be planted more closely, but are scarcely so profitable over such a long period as those on the broad-leaf paradise stock.

Although the bush-shaped tree is ideal for planting in the open garden, the various forms of trained trees are exceedingly useful, and profitable too, for setting against a wire trellis or for training over arches. The two chief types of trained apple tree are the single-stemmed cordon and the horizontal espalier which has tiers of horizontally trained branches, each tier about 12 ins. above the other. The horizontal cordon, which has a 12-in.-high stem and one branch on each side, trained in a horizontal direction, is particularly useful for planting along the sides of garden paths. Cordons with two or even three stems can be bought.

Planting Apple Trees

Apple trees must be planted at the correct distances apart if they are to have a long and profitable life. Full standards should be set at 18 ft., half-standards at 15 ft. apart. Bush-shaped trees on the broad-leaf paradise stock should be put at 12 ft., and those on the Jaune de Metz stock at 9-10 ft. from each other. Single-stemmed cordons ought to be planted at 2 ft. apart, horizontal espaliers at 12 ft. apart, and horizontal cordons at 10 ft. apart.

The best time to plant apple trees is in autumn as soon as the leaves have fallen or have changed colour preparatory to falling. November is the ideal month for the work, but planting may be carried out during mild weather in winter when the ground is not sodden, and continued until the end of March if necessary. Trees planted in early spring, however, will make less satisfactory progress the first year than others planted in autumn. Standard trees should be staked securely to prevent their being blown about in windy weather.

The ideal situation for an orchard or fruit garden is on well-drained land facing S. or S.W., but



Apple. 1. Erect growing habit of Dutch Mignon. 2. Cox's Orange Pippin, which has a more horizontal habit of growth. 3. Beauty of Kent, another distinct type. 4. Cox's Orange Pippin, considered the best dessert apple. 5. Bright red fruit of Beauty of Bath. 6. Lady Sudeley. 7. Bramley's Seedling, a late cooking apple and a good keeper. 8. Laxton's Superb

most amateurs have to make the best of the sites afforded by their plots of ground. Although clayey loam is the ideal land, apple trees will thrive in almost any soil that is manured correctly.

A mulch or soil-covering of manure or decayed vegetable material, if put on the ground round about the trees in May, will help to keep the roots moist, and that is a detail of importance. The following autumn and in the autumn of alternate years subsequently basic slag should be scattered on the soil near the trees, using 6 oz. per sq. yd. of ground. After the first year the use of sulphate of potash in spring at 2 oz. per sq. yd., and superphosphate of lime in June, applying 3 oz. per sq. yd., will prove beneficial; or a complete fruit tree fertiliser may be used in May after the blossoms have fallen.

It is not usual to prune newly planted standard, half-standard, and bush-shaped apple trees until a year or so has passed: trees planted in autumn should be pruned in Dec. of the following year. The main branches are then shortened by about two-thirds, and any side shoots are cut back to within two buds of the base.

In subsequent years the usual practice is, in summer, to prune the side shoots to within about five leaves of the base of the new growth, and in winter to cut them back again to two or three buds. The leading shoots, those at the ends of the main branches, are not pruned in summer but are shortened by half or, if weakly, by two-thirds at the winter pruning. The best period for summer pruning is from mid-July to the end of Aug.; the winter pruning may be done in Dec., Jan., or early Feb.

What is known as Lorette pruning, a system devised by a French grower of that name, now finds favour with many growers. In the modified form suited to apple trees grown in this country, it is practised by cutting down all long side shoots in summer to within a quarter-inch of the base; this in effect means cutting off the shoots altogether. The object is to force into growth those dormant buds which lie at the extreme base of the side shoots, for many of these are capable of producing blossom buds.

Lorette pruning is practised throughout the months of July and Aug. and until early Sept., for the shoots must be pruned only when they are firm and slightly woody at the base. The leading shoots, those which extend the main branches, are pruned in early spring before growth starts

by shortening them by one half or by two-thirds if not very strong.

The greatest care should be taken in making a choice of varieties for planting, for some are more reliable than others. It has been discovered that certain varieties of apple are self-fertile, *i.e.* they will set a crop of fruit even when planted alone; others are self-sterile and will not bear fruit unless their blossoms are cross-fertilised with pollen from the blossoms of other apple trees. In practice it is found best to have a mixed plantation of both dessert and cooking apples.

These are some of the best self-fertile apples. (D. denotes dessert C., cooking apples. The period in which the fruits are at their best is indicated):

Potts's Seedling (C., Aug.-Sept.).

Laxton's Exquisite (D., Sept.)

St. Everard (D., Sept.).

Rev. W. Wilks (C., Oct.).

Laxton's Fortune (D., Sept.-

Oct.).

Cellini (C., Sept.-Oct.).

James Grieve (D., Sept.-Oct.).

Egremont Russet (D., Oct.-

Nov.).

Lord Lambourne (D., Oct.-

Nov.).

Lord Derby (C., Nov.-Dec.).

Laxton's Superb (D., Dec.-

March).

Bramley's Seedling (C., Nov.-

Jan.).

Crawley Beauty (C., March-

April).

Annie Elizabeth (C., March-

May).

Cox's Orange Pippin, one of the

most delicious of all apples, is

self-sterile: it should be planted

near Worcester Pearmain and

James Grieve.

The early apples, those which ripen in Aug.-Sept., should be eaten from the tree, or stored only for a few days. Apples which are stored for use in late autumn, winter, and early spring must be left on the trees as long as possible or they will shrivel and lose flavour. Apples keep best in a cool and rather damp, frost-proof shed. The choicest fruits should be wrapped in paper before being put away. A dry airy attic is an unsuitable place for storing apples.

Apple trees are unfortunately subject to the attacks of many pests and diseases and these must be prevented or reduced to a minimum to ensure a harvest of sound fruits. The following are the measures of control generally practised. Greasebands are placed on the tree stems in Sept.; spraying with a tar-oil caustic wash is done in Dec.-Jan., or with other suitable wash, *e.g.* Thiol, in Feb.-

March; spraying with nicotine insecticide, just before the blossoms open and again as soon as they have fallen, and with lime sulphur in May and July to prevent brown rot and scab respectively. Placing bands of corrugated paper or sacking on the stems in May and taking them off and burning them in autumn will check the troublesome apple blossom weevil. The use of a brush dipped in methylated spirit or paraffin will destroy American Blight.

Bibliography. The Apple, A. E. Wilkinson, 1915; Apples and Pears, E. A. Bunyard, 1920; Handbook of Hardy Fruits, E. A. Bunyard, 1920; Commercial Apple Growing, A. H. Hoare, 1937.

Appleby. Mun. borough, market town, and co. town of Westmorland, England. It is picturesquely situated on the Eden, 30 m. S.W.



Appleby arms

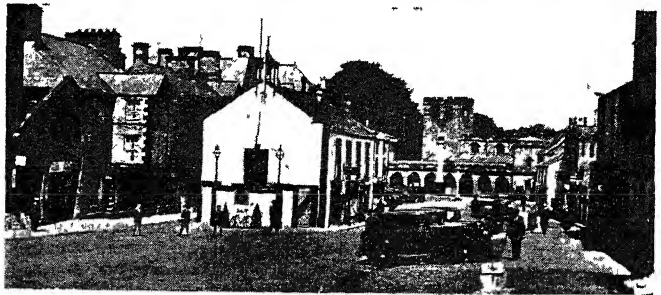
of Carlisle, with good rly. services. It has town and shire halls, a grammar school founded in 1453, an old church, and a rebuilt castle with Norman keep. Appleby received charters from Henry II and other monarchs, but was incorporated on modern lines in 1885. It returned two members to Parliament from the end of the 13th century until 1832. Appleby was prominent in Roman times, was destroyed by the Scots in 1176 and 1388, aided the Royal-

at the Malvern festival on Aug. 19, 1929. It was transferred to the Queen's Theatre, London, the following month. The principal characters were played by (Sir) Cedric Hardwicke (King Magnus), Charles Carson (prime minister), and Edith Evans (Orinithia).

Appledore. Seaport of Devon, England. At the junction of the Taw and Torridge estuaries as they flow into Barnstaple Bay, it is ancient, narrow, and cobbled. There is a ferry to Instow, and interesting places within walking distance include Bideford, Northam, and Westward Ho. Ship repairing is one of the industries. Market day, Sat. Another Appledore is on the edge of Romney Marsh, Kent.

Appleton. Village of Berkshire, England, 7 m. S.W. of Oxford. On April 22, 1922, there was rung on the ten bells of the church a peal of Stedman Caters of 21,363 changes, lasting 12 hours 25 minutes, the longest peal rung in Britain by one set of men. Other feats of bell-ringing are also recorded in the church, which itself contains work of c. 1180 (Transitional).

Appleton. City of Wisconsin, U.S.A., and the co. seat of Outagamie county. Situated on the Grand Chute Rapids of the Fox river, which supply power for numerous paper, flour, woollen, and saw mills, it is 98 m. N.W. of Milwaukee, by the Chicago and N.W. rly. It has large breweries and foundries, makes chairs, spokes, hubs, etc., and is the seat of Lawrence University. Pop. 28,436.



Appleby, Westmorland. Boroughgate, the main thoroughfare, with the cloisters and the church of S. Lawrence in the background

ists in the Civil War, and was taken by the Parliamentarians after Marston Moor. Market day, Sat. Pop. 1,618.

Apple Cart, THE. Play by Bernard Shaw, described by him as a political extravaganza. First performed in Warsaw in the Polish version by Sobieniewski, it was produced by Sir Barry Jackson

Appleton, DANIEL (1785-1849). American publisher. Born at Haverhill, Mass., he was at first employed in the drapery business; then he moved to Boston, then to New York, adding the importing of books to his existing ventures. In 1834 he established the publishing firm since known as Appletons (D. Appleton-Century).

Appleton, SIR EDWARD VICTOR (b. 1892). British scientist. Born at Bradford, Sept. 6, 1892, the son of a mill worker, he was educated at Hanson School, Bradford, and St. John's, Cambridge. He became assistant demonstrator in the Cavendish laboratory, Cambridge; Wheatstone prof. of physics, London University, 1924-36; then Jacksonian prof. of natural philosophy, Cambridge, until in 1939 he was appointed secretary of the D.S.I.R. Elected F.R.S. in 1927, he gained for his researches into wireless telegraphy and later radar the 1947 Nobel prize for physics. In 1945 he became the British govt.'s chief scientific adviser, and in 1948 principal and vice-chancellor of Edinburgh University.

Appleton Layer. Ionised layer of the upper atmosphere, about 150 miles above the earth, named after Sir E. V. Appleton (v.s.). According to the prevailing theory, this layer causes the reflection of short-wave electromagnetic radiations. The longer waves, it is assumed, are similarly reflected by a lower ionised layer—Heaviside layer (q.v.)—situated at about 60 m. above the earth's surface.

Appiqué (French, applied). In architecture, any decorative feature applied to an object or structure. In decorative art generally, a piece or pattern of one material set upon the surface of another for decorative effect.

Appoggiatura (Ital. *appoggiare*, to lean). Name of an ornamental musical note preceding an



essential note. An appoggiatura takes the accent from the following note, and also an appreciable amount of its time value, viz. half of an ordinary note or two-thirds of a dotted note. The appoggiatura was originally written as a small note, without a dash through the tail (contrast this with *acciaccatura*), but today it is customary to write the exact time value in ordinary notation.

Appointment (Lat. *ad*, to; *punctum*, point). A term employed in English law. Where property is settled so as to give someone called the appointor the right to dispose of it, though the appointor is not the owner, an exercise of this right is called an appointment. For example, "I give my property to trustees, X and Y, to pay the income to my wife, A, during her life, and after her death to divide the pro-

perty amongst such of my children as she shall appoint by deed or will." This is a very common form. A's deed or will by which she exercises this power is an appointment.

Appomattox. A river of Virginia, U.S.A. It rises in Appomattox county and flows E. to the James river at City Point. About 150 m. long, it is navigable by small steamers to Petersburg, 15 m. from its mouth, and by smaller vessels to Farmville, over 100 m. up.

Appomattox Court House. Village of Virginia, U.S.A., in Appomattox county. It is 23 m. E. of Lynchburg on the Norfolk and Western rly. Here the Confederate army under Lee surrendered to Grant, April 9, 1865, thus ending the American Civil War.

Apponyi, ALBERT, COUNT (1846-1933). Hungarian statesman.

Son of Count George Apponyi, he joined the Liberal party in 1899 and was president of the Chamber of Deputies 1901-3. Leaving the Liberal party in 1903, he became leader of the new National party.



Count A. Apponyi, Hungarian statesman

He was made minister of education in 1906 in the Wekerle cabinet and again in June, 1917, in the Esterházy cabinet, and minister of public instruction in the reorganized Wekerle cabinet, Jan., 1918. He retired in Nov., 1918, but came forward in Jan., 1920, to lead the delegation to Paris to settle the peace with Hungary. Later he represented Hungary in the League of Nations. He died Feb. 7, 1933. Consult his *Memoirs*, 1935.

Apportionment (Lat. *ad*, to; *portio*, portion). English legal term, meaning the division or partition of a whole estate or interest in property into parts or portions. By law, if a reversioner of a lease assigns part of his reversion, the rent is liable to be apportioned. Thus, A makes a lease to me of land or houses at a whole rent, and it turns out that part of the property was not his, and I am evicted by the real owner; the rent therefore becomes apportionable—that is, I have only to pay a part proportionate to the property rightfully leased to me. By the Apportionment Act, 1870, all rents, interest, and periodical payments are to be deemed to accrue from day to day, so that they can always be apportioned between the people entitled where a change

of ownership takes place—e.g. in the middle of a quarter.

Apposition (Lat. *ad*, to; *ponere*, to place). Term used in grammar. When one noun is followed by another, which explains or limits it, the second noun is said to be in apposition to the first (George, king of England). In inflexional languages both nouns must be in the same case.

Appraiser (Lat. *appreciare*, to set a price on). One licensed to appraise or value property, real or personal. On distress for rent an appraisal of goods before sale is necessary only if tenant or owner of the goods demands it, or if the goods are growing crops. A yearly licence costs £2, and the stamp duty payable in the appraisal varies from 3d. for £5 value to 20s. for £500 or over. Licensed auctioneers and house agents and county court bailiffs do not need licences. No duty is payable on appraisements made for a person's own convenience, e.g. on insuring goods, or for an affidavit as to the estate of a deceased person or for fixing legacy or succession duty or made under order of an Admiralty court.

Apprehension (Lat. *apprehensio*, laying hold of). Philosophical term for the act or power of grasping with the intellect. According to Kant, this faculty plays a great part in the formation of concepts. All concepts are subject to time, and the mind must distinguish the time in the succession of impressions. Concepts arise from the synthesis or combination into a single whole of the manifold elements or characteristics apprehended.

Apprenticeship. The apprenticeship system of industrial training seems to have originated far back in the Middle Ages. There is abundant evidence that it was already fully established in England as the recognized system of training for all skilled trades as early as the 13th century, by which time the guilds had become the autocrats of commerce and industry throughout the country.

The system was successfully maintained by the guilds purely as a guild system, without any statutory sanction behind it, for over 200 years. When the power of the guilds had begun seriously to decline, the system received definite statutory sanction by the passing of the Statute of Apprentices or Statute of Artificers in 1562. The effect of this statute was to erect into a national system, obligatory on all desirous of entering a skilled trade, that which had previously

flourished merely as a guild custom, deriving its force and validity mainly from the guild, but recognized and supported by public opinion and the municipal authorities. In some cases, it is true, the guilds' hands had been strengthened by the grant of a royal charter.

The statute of 1562 remained nominally in force until repealed in 1814. It enacted, *inter alia*, that a uniform term of seven years' apprenticeship must be served as a condition precedent to the right to practise any manual trade, and until well into the 18th century the law was rigidly enforced. For many years, however, before its actual repeal, a certain laxity in the administration of the statute had begun, and with its repeal apprenticeship as a voluntary system of industrial training soon began to show signs of decay. This process was hastened by a variety of factors which came into play as the result of the far-reaching social and industrial changes that marked the course of the 19th century, among them the growth of large factories, which took the place of numerous small workshops and thus rendered the training of apprentices much more difficult.

Another factor was the substitution of limited liability companies for private firms, resulting in the weakening of the sense of responsibility towards the apprentice and the disappearance of the old personal relationship between him and his master. In addition, there was the obstinate retention of old forms of indenture unsuited to modern social and industrial conditions, and often in direct conflict with prevailing educational and hygienic ideals; while the lure of blind-alley occupations offered a high initial wage and freedom from the restraints of the apprenticeship system.

The Traditional System

The old apprenticeship system was calculated to produce a type of workman who was thoroughly master of his trade. It was no doubt largely as the result of the system that England produced for so many years the finest type of mechanic and skilled artisan in the world. Probably nothing contributed more to gain for her in the Victorian Age the distinction of being the workshop of the world. The system was based upon the principle that the apprentice was first and foremost a pupil or student, not an employee or wage earner, and, as a corollary, that the master had certain very definite responsibilities towards

him. This is clearly shown in the special legal status of apprentices consistently laid down and recognized by English judges for centuries.

The traditional form of apprenticeship practically placed the master *in loco parentis* towards the apprentice. This relationship almost necessarily resulted so long as it was customary for the apprentice to board and lodge with his master. Under these conditions the apprentice practically became for the time being a member of his master's household. The system had the virtue of imposing a most salutary discipline and restraint on the apprentice during the most difficult period of a boy's life. To this extent it was in striking contrast to the conditions obtaining since its decay in the case of the unbound lad who is free to come and go at his pleasure.

Modern Practice

The terms apprenticeship and apprentice, which originally always implied a strict form of indenture, are now used somewhat loosely. The indenture was from the earliest times a feature of the system, and there were certain definite covenants entered into by the contracting parties which have endured, with but little alteration, to the present time. In recent years the term apprentice has been applied to lads working either under a loose form of agreement of doubtful legal validity, or under no written agreement at all.

The term apprentice, in fact, now denotes any lad who is undergoing a more or less systematic course of training in a skilled trade, quite irrespective of any legal relationship between himself and his master.

The whole field of apprenticeship has been affected by the two Great Wars. The demand for unskilled and semi-skilled labour, commanding high wages, has to a very great extent killed the apprenticeship system. The fixing of the calling-up age for military service at 18 made the former system quite impracticable. The place of apprenticeship was largely filled by the Ministry of Labour's schemes of training, reconditioning, and resettlement centres. Originally these schemes had as their objective the training of men for war industry; but they were subsequently reviewed for the purpose of adapting them to the needs of civilian occupations in times of peace. See Education, Technical; Guild; and under various industries, e.g. Engineering.

Approbate. English legal term. It is an old doctrine of the English common law that a man cannot both approve and reprobate, that is, he cannot both affirm and deny; he cannot say an instrument is both good and bad. In Scots law one is said to be approve and reprobate when one takes advantage of one part of a document and rejects the rest.

Appropriation (Latin *ad*, to; *proprius*, own). Term in English law. When a debtor owes more than one debt to a creditor and makes a payment, he may appropriate the payment to whichever debt he pleases. Thus, if I owe my dentist a bill for 1943, another for 1944, and another for 1945, when I send him a cheque I have the right to say "Apply this cheque towards the 1945 account." If the debtor does not appropriate, the creditor may do so; and he can even apply it to paying a debt which he could not sue for, e.g. a debt barred by the Statute of Limitations. If neither debtor nor creditor makes any appropriation, the law appropriates the money to the earliest debt, unless this was manifestly not the intention of the two parties concerned.

In Parliamentary procedure the Appropriation Act is enforced at the end of each session, stating the purpose to which the money voted must be applied.

Appropriations in Aid. In British finance, cash receipts used by the various government departments towards meeting their gross expenditure. For instance, certain departments receive large sums from Empire governments for defence contributions, and most departments receive money as fees for services rendered, from rents, sales of materials, etc. If so shown in the estimate, these sums are not paid into the Exchequer, but are treated as appropriations in aid of the expenses of each department. See Finance, National.

Approver (Lat. *ad*, to; *probare*, to test, prove). Legal term used in Ireland to describe one who has turned king's evidence. Hawkins's Pleas of the Crown describes an approver as a person who, being an accomplice in treason or felony, tried to obtain a pardon by confessing before he was arraigned, and taking an oath to reveal all the treasons and felonies he knew. Carey, the Fenian, was a noted case of an approver.

Approximation (Lat. *ad*, to; *proximus*, nearest). Mathematical process of finding values which are

successively nearer the truth, though they may never reach it.

Appurtenant (Latin *ad*, to: *pertinere*, to belong). English legal term meaning very much the same as appendant. Certain rights of an accessory kind are frequently enjoyed because they are attached to property, and if acquired otherwise than by prescription are called appurtenances. If this is not the case they are called appendants. See Appendant.

Apraxin, FEODOR MATVEYEVITCH, COUNT (1671-1728). Russian admiral. He early entered the imperial service, and in 1692 was made governor of Archangel and in 1700 chief of the admiralty. By his efforts the Russian navy was established. In 1708 he successfully defended St. Petersburg against the Swedes, in 1710 captured Viborg in Finland, and in 1713, by inflicting a severe defeat on the Swedish fleet, he made Russia supreme in the Baltic. Fined for embezzlement in 1714 and 1718, he was too valuable to be dismissed, and he accompanied Peter the Great to Persia in 1722. He died at Moscow, Nov. 10, 1728.

Aprica Pass. Pass over the Bergamasque Alps in N. Italy. There is a carriage-road from Edolo, in the Val Camonica, to Tresenda, in Val Tellina. The village of Aprica is prettily situated just below the pass.

Apricot. A fruit tree of the natural order Rosaceae, *Prunus Armeniaca*. A native of Asia, it was introduced into England in 1652. The culture is the same as for peaches, but warm S. walls are needed to develop and ripen the fruit. The best soil is loam mixed with sand. Trees should be planted in autumn, and the best system of propagation is by budding in June or July. Under glass the apricot should be planted out in a soil consisting largely of lime and burnt wood ashes, and in such a position that light and air can be regulated easily. Sudden currents of icy wind are fatal to the proper ripening of apricots. The word, in French *abricot*, is probably a compound of Arabic *al*, the, and Latin *prae-coquus*, prematurely ripe, from late Greek *praiokion*. The earlier English word apricoek was derived from Portuguese *abricoque*.

Apries. Egyptian king of the XXVIth dynasty (c. 589-570 B.C.). The Greised form of the native name Uahabra, it appears as Pharaoh-hopra in Jer. 44. Capturing Sidon by a sea battle, he entered into an unsuccessful league

with Zedekiah of Jerusalem against Nebuchadrezzar II. He was deposed in favour of Aahmes II by a military revolt in Libya. He was then interned at Sais and finally strangled. See Memphis.

April. Fourth month of the Christian calendar. The name is usually derived from Latin *aperire*, to open, in allusion to the opening of the buds. The Anglo-Saxon name was Oster-monath, from the spring goddess Eoster, whence Easter. The risings in France in 1834 against Louis Philippe are known as the "days of April." See All Fools' Day; Calendar.

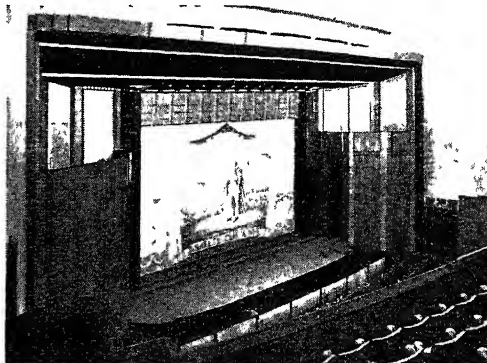
A priori; a posteriori (Latin, from the earlier, from the later). Terms closely connected with the question of the origin of knowledge. Aristotle, and after him the scholastics, distinguished *a priori* knowledge, obtained by arguing from causes to effects, from *a posteriori* knowledge, obtained from arguing from effects to causes. According to Kant, *a priori* knowledge consists of general, necessary truths, already existing in the mind, independent of experience; *a posteriori* knowledge is empirical, the result of experience, and cannot supply general truths, for experience merely tells us that a thing is, not that it must be as it is. See Philosophy; Logic.

Apron. Word of unsettled etymology, probably derived from O.Fr. *napperon*, diminutive of *nappe*, from Lat. *nappa*, a cloth. In the N. of England the form is *nappern*; elsewhere a *napron* was corrupted to an apron. The garment has been in use for centuries. Chaucer mentions a *barme* or lap cloth (A.S. *barm*, lap or bosom), while an old illustration depicts a 14th century smith in a leather apron. In Northumberland the term *barm-skin* survives. Pinner was a name applied when a bib was pinned to the dress: hence pinafore. Mary Queen of Scots is said to have left over 100 aprons. Queen Anne and her contemporaries wore aprons with rich embroidery and decoration. The apron of the Anglican bishop is a short cassock, worn in obedience to the 74th canon of Convocation,

1603-4. The symbolic aprons worn by Freemasons are of lamb-skin, and are variously embellished.

In engineering, an apron signifies a protective covering, such as the sloping masonry platform at the foot of a dam, which prevents water from injuring the foundations. In the First Great War balloon aprons were part of the aerial defence of London. The paved embarkation point of an airfield is also called an apron. See Balloon Defences.

Apron Stage. Part of a theatre stage which projects into the auditorium. Developed from the Elizabethan platform, this was at first peculiar to the English theatre. Its use died out with



Apron Stage. Modern example of this form of stage at the Memorial Theatre, Stratford-on-Avon

the introduction of the front curtain, but it has been revived in the present century, e.g. at the Maddermarket Theatre, Norwich, and Mercury Theatre, Nottingham Hill, for production of Elizabethan or Restoration drama.

Apsaras. In Hindu mythology, two classes, divine and mundane, of nymphs and fairies. Sometimes as insubstantial cloudy creatures, or as water sprites, they are regarded as Oriental parallels to the swan-maidens of western tradition, or the nymphs of the Greeks. They are also spoken of as nymphs of heaven, attendants on heroes, like the houris of the Mahomedan paradise.

Apse (Greek *apsis*, fastening, circle). In ecclesiastical architecture, the semi-circular or polygonal termination of the nave or of the aisles of a basilica. In medieval churches it was the space reserved for the altar, and usually vaulted. Some Norman churches in England have semi-circular apses at the E. end; that in Peterborough Cathedral has fine windows with geometric tracery. One of the transepts at Lincoln has semi-circular

apses to its E chapels, and the apse of Lichfield Cathedral is a polygon. The apse often had a diameter equal to the width of the church, allowing for aisles to surround the altar, forming what is known as the ambulatory. The early chapel of S John in the Tower of London has an apse with half domed roof, and the 12th century church of S Bartholomew the Great, Smithfield, London, restored 1864-1906, has the same feature. The apse was revived by Wren in S Paul's, and the church of S Mary le Strand, London, shows an example, balanced at the W end by a semi circular portico. Generally speaking, the apse was discontinued earlier in England than on the Continent, it may still be seen in numerous Romanesque churches in Italy.

Apsheeron. Peninsula of S W Russia. It extends for 40 m into the Caspian Sea and forms the E extremity of the Caucasus Mts. It is remarkable for its volcanic condition, petroleum wells, mud volcanoes, and saline lakes. Baku stands on the S coast.

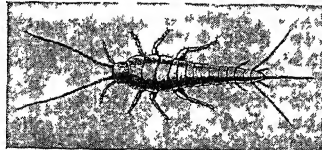
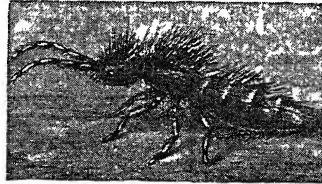
Apsides. Astronomical term applied chiefly to the aphelion and perihelion points of any body in the solar system. The line of the apsides, therefore, joins the points in the orbits of these bodies when they are respectively farthest from and nearest to the sun, and so is the major axis of ellipse like orbits.

Apsley House. London residence of the dukes of Wellington. It is in Piccadilly, at the western end of Hyde Park end, and was built in 1771-8 by the Adam brothers for Lord Apsley on the site of Hercules' Pillars Inn. Presented by the nation in 1820 to the Iron Duke, its original red brick was faced with stone in 1828-29. See N V.

Apt. Town of France, in the department of Vaucluse. The ancient Apta Julia, it is 40 m by

rly E of Avignon, and stands on the Coulon. Apt was a bishopric until 1790, and its church of S Anne was the cathedral. Some traces of its city walls remain, although to a large extent boulevards have replaced them. It was a settlement of the Gauls and afterwards of the Romans, later it was in Provence.

Aptera (Gr *apteros*, wingless) Order of wingless insects, including the sub orders Collembola (Spring

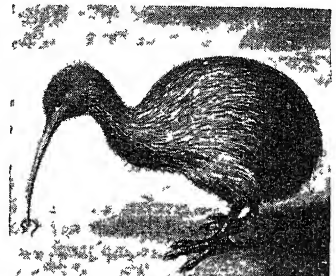


Aptera. Two specimens, both of them greatly enlarged, of this order of wingless insects *Lepisma saccharina*, and (above) *Podura villosa*.

tails) and *Thysanura* (Bristle tails). In many respects they suggest that they have remained in the larval stage and failed to develop into perfect insects. They are all very small.

Apteryx. A genus of ratite birds found only in New Zealand. The native name is kiwi. The apteryx has small and rudimentary wings, hidden beneath the feathers and useless for flight. The feathers are long, narrow, and simple in character, giving the bird the appearance of being covered with coarse hair. The beak is of great length, and the nostrils are at the tip, a feature found in no other living species of bird. The apteryx

is nocturnal, and sleeps throughout the day. It is timid and inoffensive. The female lays one egg—rarely two, the nest is a hollow in the ground. The egg measures about 5 ins by 3 ins, enormous for a bird no larger than the domestic hen. The work of incubation is undertaken by the cock. The bird has become



Apteryx australis, or kiwi, known as the wingless bird of New Zealand.

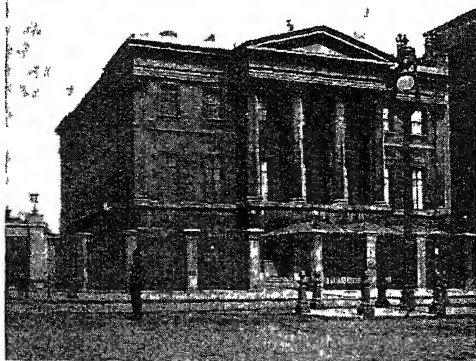
scarce, but is protected by the New Zealand Government.

Apuan Alps. Outlying range of the Apennines in NW Italy. They extend for 30 m between the main range and the Mediterranean, and contain some of the finest marble in the world. The quarries were known to the Romans and are still worked. The highest point is Monte Pisanino, 6,383 ft. See Carrara.

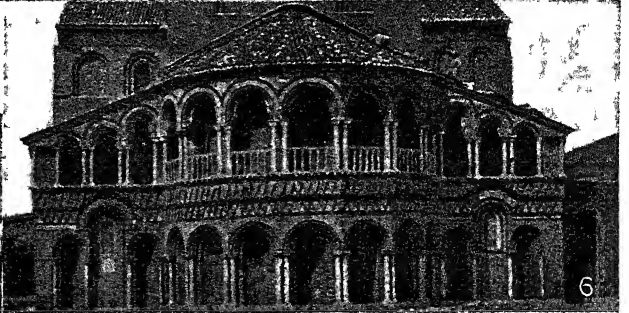
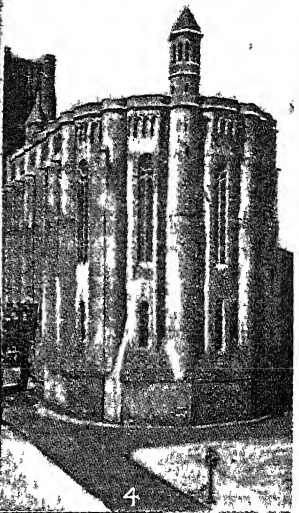
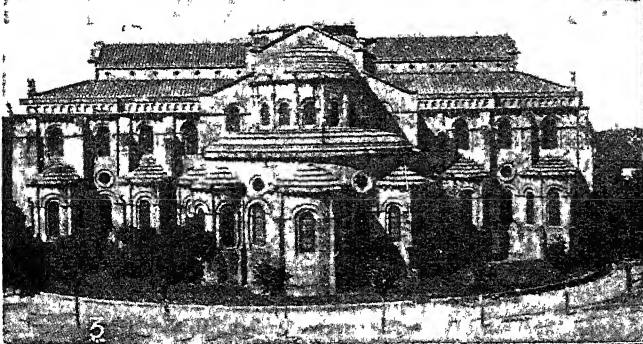
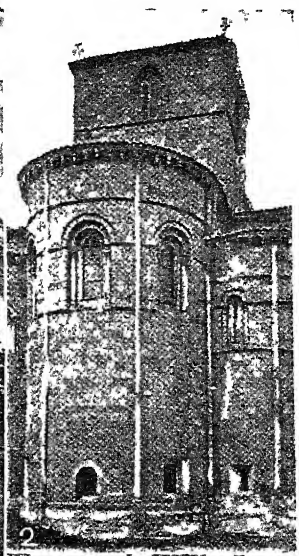
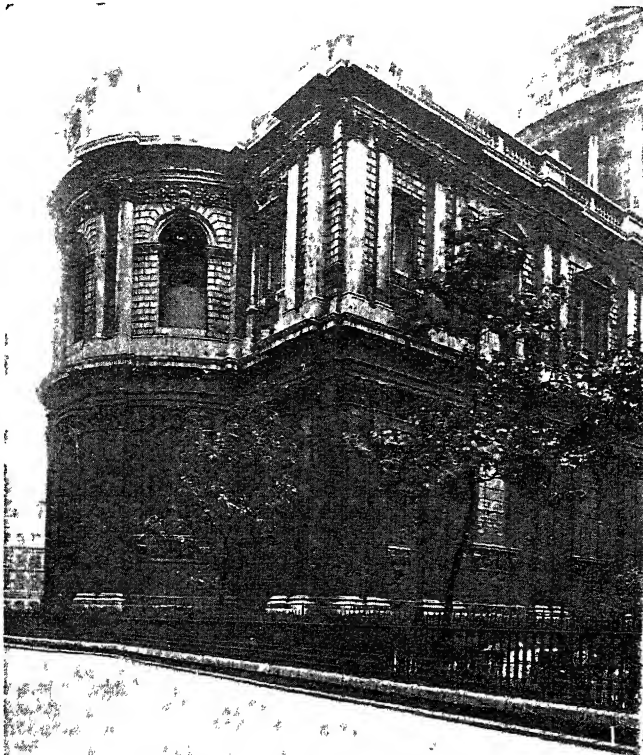
Apuania. Municipality of Tuscany, Italy, which also gives its name to a prov. It was formed in 1935 from the neighbouring towns of Carrara and Massa, and had a prewar pop of 106,378. See Carrara, Massa.

Apuleius, Lucius. A Roman writer who flourished in the latter half of the 2nd century A.D. An African by birth, after travelling extensively he settled down as a rhetorician in Carthage. His best known work is *The Golden Ass*, a prose romance purporting to describe the experiences of one Lucius, whom an enchantress had transformed into an ass. The most interesting episode is the story of Cupid and Psyche. *The Golden Ass*, a forerunner of the modern novel, is written in African Latin, in the new style which had superseded that of the Augustan age. Apuleius was a student of neo Platonism, a strong supporter of paganism, and favoured a revival of the ancient mysteries. Some philosophical writings and his defence against a charge of sorcery are also extant. Eng trans of *The Golden Ass*, W Adlington, 1566, reprinted 1913, H E Butler, 1910.

Apulia (Italian *Puglia*). A com partimento or territorial division of SE Italy. It includes the provinces of Foggia, Bari, Brindisi, Taranto, and Lecce, and has an area of 7,442 sq m. Bounded E and N by the Adriatic, and SW by the Gulf of Taranto, it is largely level, the highest point being Monte Gargano, 3,464 ft. The only large river is the Ofanto, about 100 m. long. The chief industries are pastoral and agricultural. Sheep,



Apsley House, Hyde Park Corner, London. It is the residence of the duke of Wellington, having been presented by the nation to the first duke in 1820.



1 Apse of St Paul's Cathedral London, one of the finest of the world's Renaissance cathedrals 2 St Vicente Avila Spain, Romanesque 3 St Sernin, Toulouse France 4 Cathedral of St Cecilia Albi, France, a perfect example

or southern Gothic 5 Plain Renaissance apse added to the fine 6th century basilica of St Apollinaris at Classe, near Ravenna, Italy 6 The beautiful double cloistered apse of St Donatus Venice 10th century

APSE EXAMPLES IN ENGLAND SPAIN, FRANCE AND ITALY

cattle, horses, and swine are reared cereals, fruits, tobacco, and wine are produced. marble is worked, and olive oil exported. The chief ports are Bari, Brindisi, Taranto, Barletta, and Gallipoli. Other towns are Andria, Foggia, Corato, Lecce, Molfetta, and Monopoli. Originally civilized by Greek colonists, Apulia submitted to Rome in 317 B.C., and suffered severely in the Punic wars and also in the Social War of 90-88 B.C., after which it never recovered its ancient prosperity. Conquered in 668 by the Longobardi, and in 1043 by the Normans, who made it a duchy it became part of the Two Sicilies in 1734 and of the kingdom of Italy in 1861. Pop. 2,886,570.

Apuré. River of Venezuela. Rising in the Cordillera de Mérida, on the Colombian border, it flows 700 m. N.E. to the Orinoco. It receives the Portuguesa, Guarico, Caparro, and Caucagua, and is navigable for about 600 m.

Apuré. State in the N.W. of Venezuela. Bounded N. by the states of Barinas and Guarico and S. by Colombia, its main industries are cattle-breeding and exporting hides. San Fernando is the capital. Pop. 71,271.

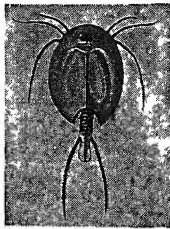
Apurimac. River of south-central Peru. It rises in the Andes and flows N.E. and N.W. to the Ucayali, a tributary of the Amazon, of which it is considered a head water. A turbulent stream, broken by rapids and only partly navigable, it is called the Tambo after its junction with the Perené, and is 600 m. long.

Apurimac. Department of south-central Peru. It is watered by the Apurimac and its tributaries, and has an area of 8,187 sq. m. Mainly a plateau, with forests and pastures, it produces coffee, sugar, rice, cocoa, and rubber. The principal towns are Abancay, the capital, and Andahuaylas, about 50 m. to the N.W. Pop. 258,094.

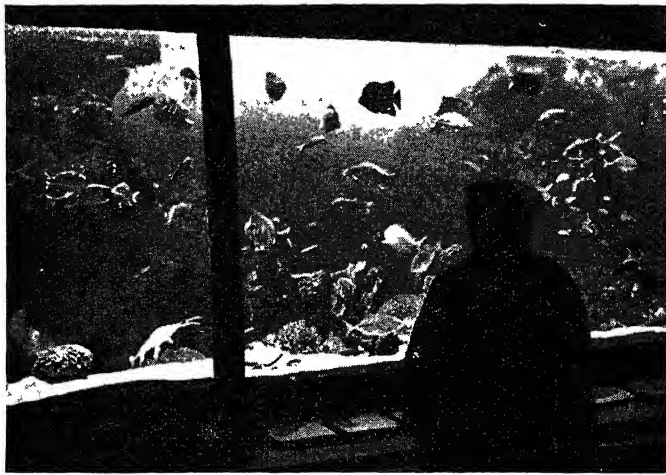
Apus. In astronomy, the Bird of Paradise, one of the more recently discovered constellations of the southern circumpolar stars.

See Constellations.

Apus (Greek *apous*, footless). A small freshwater crustacean of the family of Phyllopods. It has a comparatively large carapace, covering the head and part of the thorax



Apus. *Lepidurus*, or scale-tailed apus (enlarged)



Aquarium. In the brilliantly lit tanks of the aquarium at the London Zoo are to be found fish from all the seas of the world

the abdominal appendages being exposed. Often nearly an inch in length, it swims on its back, the action of the legs resembling that of paddles. The eggs can survive long periods of drought. It is related to the familiar brine shrimp of the shore.

Aquae Sulis. Roman name for Bath, Somerset. The meaning was originally conjectured to be Waters of the Sun, but it is as probable that the derivation is from Sul, a local goddess identified with Minerva by the Romans when they founded the watering-place c. A.D. 44. A temple to this deity was one of the city's earliest buildings. See Bath

Aqua fortis (Lat., strong water). Ancient and still popular name for nitric acid (*q.v.*). The strongest is called double aqua fortis.

Aquamarine. Popular name of the bluish-green varieties of beryl, topaz, and apatite. The word comes from Latin *aqua marina*, sea water, in allusion to the colour and is also used as an adjective to denote bluish green. The aquamarine is found in the Ural Mts and in Brazil, the latter country also yielding pretty aquamarine chrysolite of a yellowish-green hue.

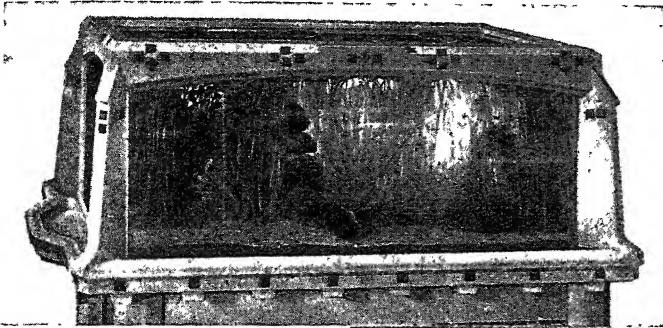
Aqua regia (Lat., royal water). A mixture of one volume of nitric acid and four volumes of hydrochloric acid. It was so called because it was found to dissolve gold, the king of metals

Aquarelle. French term for a process of painting with water-colours distinguished from other processes by the translucency of the pigments. As a rule Chinese and process whites are not employed See Water-Colour Painting

Aquarium (Lat. *aquarius*, pertaining to water). Vessel constructed as a cage in which one may observe living aquatic animals and plants in fresh or salt water. It usually takes the form of a four-sided tank, constructed of glass and slate or of glass and zinc. The best form has the front of plate glass, and the bottom, back, and ends of slate.

Aquatic animals, such as fishes and many insects, respire by extracting the oxygen that is dissolved in the water, and this has to be replaced by the activity of living plants under the influence of sunlight. The animal inhabitants of a tank must never be in too great a proportion to the plants, or insufficient oxygen will be given off to supply their needs, and they will die. Given a proper balance in this respect, there is no need to change the water, unless it becomes fouled by the decomposition of unconsumed food. Fresh water should be added to make up the loss by evaporation. Frogs and newts, which are lung-breathers, and only live in water in the breeding season, should not be admitted to the aquarium. Suitable water plants may be obtained from any dealer. The Canadian pond-weed (*Elodea canadensis*) is one of the best, as it is a quick grower and needs no soil for roots.

Care must be taken to exclude creatures that prey upon others. The large diving beetle (*Dytiscus*) and all the water-bugs (*Hemiptera*) are of this class, and will soon destroy fishes, tadpoles, and snails. Minute worms, thread-like fragments of raw meat, and crushed vermicelli may be given occasionally

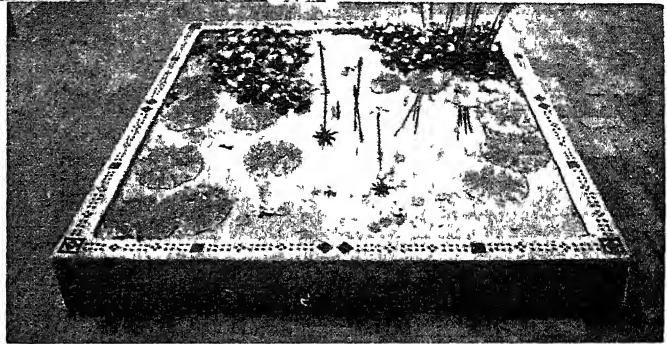


as food; but only in such quantity as can be eaten at once.

The marine aquarium should be filled with sea-water, and a line should be marked on the glass front to indicate the original height of the water. As, owing to evaporation, the water sinks below this line, it should be made good by the addition of fresh water, otherwise it will become too salt. Small green seaweeds attached to pebbles or shells should be sought on the shore for removal to the aquarium; the brown or olive wracks are unsuitable for the purpose. Sea-anemones, zoophytes, shrimps, small crabs, molluscs, and a few of the smaller species of shore-haunting fishes are the most suitable inmates; and morsels of raw fish should be given as food. If any dead or decaying matter is at once removed, such an aquarium may be maintained without change of water for months. If far from the coast, provision for a change of water should be made at the beginning by obtaining a cask of sea-water equal to about four times the capacity of the tank. Should a change become necessary, draw off the whole of the water from the aquarium by means of a siphon, and refill from the store cask. Then carefully strain the foul water through two or three thicknesses of fine muslin, and pour it into the store cask. By admixture with the greater volume of water still left, and by being kept in the dark, the fouled water will soon become wholesome again.

Exhibition aquariums of large size have become increasingly popular with the public. Famous examples are at Monaco, Brighton, the London Zoo, and in New York, Boston, San Francisco, Washington, and New Orleans.

Aquarius. One of the oldest constellations. The name signifies the water-bearer. Its place in the heavens is indicated by the lines: Down from bright Vega cast your glance across the Dolphin's space, Then just as far again you'll find the Water-bearer's place.



Aquarium. Open-air tank form, made of reinforced concrete; and (above) a handsome form of stand aquarium

From time immemorial the constellation has been represented as a man pouring out a stream of water from a pitcher, apparently on Pisces, the Fish. The water-bearer's right arm is stretched backwards so as to reach over almost the entire length of Capricornus. The stream of water trickles down to the star Fomalhaut, one of the four ancient royal stars and the mouth of the Fish. See Constellations: Zodiak.

Aquatint (Latin *aqua tincla*, dyed water). The name applied to a mode of etching on copper with a resin ground resulting in resemblances to flat washes of water-colour in monochrome. Aquatints were first produced in France by Leprince, 1750, and in England by Paul Sandby, 1775. See Etching.

Aqua Tofana. Poison reputed to have been used in Italy in the 17th century. It was most probably a solution of arsenic, and was said to be a tasteless and odourless liquid, a few drops being sufficient to bring about death. The name is supposed to be derived from a Sicilian woman who first prepared it.

Aquaviva. Variant spelling of the name of the Jesuit general, Acquaviva (q.v.).

Aqueduct (Lat. *aquae ductus*, conveyance of water). Conduit in which water flows or is conveyed from one point to another. Actually

a water pipe or a canal fulfils this condition, but in the generally accepted sense of the word an aqueduct is an artificial channel in which water intended for domestic, power, or other purposes flows by gravity, at least for a considerable portion of the distance, between the source of supply and the destination. In modern practice detached sections of aqueducts proper are often conducted by pipe line sections and siphons.

The most famous builders of aqueducts were the Romans, and

many of the ruins of their structures exist in Italy and elsewhere on the Continent. Aqueducts brought water to Rome from the Alban and Apennine hills, but especially from the springs of Tivoli. One of these ancient waterways was the Anio Vetus, begun by M. Curius Dentatus about 273 B.C. It measured approximately 71,000 yds. in length.

The oldest Roman aqueduct was that of Appius Claudius, which dates from about 310 B.C. This conveyed the Aqua Appia to Rome over a distance of some 19,000 yds. Both these aqueducts had fallen into disuse by 150 B.C. It was then that the conduit for the Aqua Marcia was brought to Rome from Subiaco, some 20 m. beyond Tivoli. During the reign of Agrippa all the aqueducts were restored, and the later emperors added the Aqua Claudia and the Anio Novus. The height of some of the arches was about 100 ft.

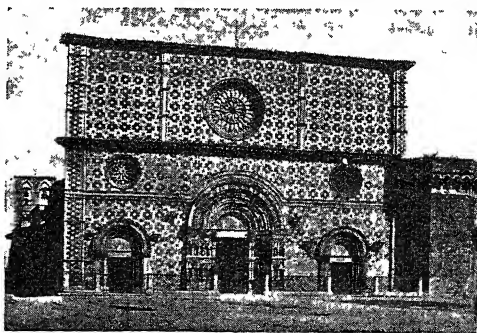
A notable Roman aqueduct is that of Segovia in Spain. It begins in the Sierra Guadarrama, 10 m. distant, and, after traversing the intervening hills and dales, crosses the streets of the city to the Alcazar. It is built of great blocks of granite, without mortar or clamps, and its arches vary from 23 ft. to 94 ft. in height. Dating from the time of Trajan, it was restored by Queen Isabella of Spain in the 15th

century. There are also ruins of important aqueducts at Metz and at Nîmes. Other Roman aqueducts are to be found at Tarragona, Lyons, Fréjus, and Luynes. The Roman structures were mostly built of stone, but bricks and concrete appear to have been used. Roman aqueducts followed a uniform slope throughout, the water flowing by gravity.

The picture on this page shows a bridge-like structure used to carry the Birmingham aqueduct over Deepwood bridge; in modern practice, however, the original type of aqueduct has for most purposes been superseded by the use of pipes, which are now usually of cast iron or steel, or by closed conduits constructed of reinforced concrete. In some cases, however, where the natural slope of the ground permits of the requisite fall, a trench is dug, an inverted arch of concrete is formed on the bottom, side walls are raised on this, and an arched roof is added to exclude polluting matter. The trench is then covered with the excavated earth, which affords protection from heat and cold.

Tunnels are used where the watercourse has to go through an elevation or underneath a river. In the Lake Vyrnwy scheme for supplying water to Liverpool a tunnel 7 ft. in diameter and $3\frac{3}{4}$ m. long forms part of the 68-mile course of the aqueduct.

Much larger and longer tunnels have been driven for some of the American aqueducts. The Delaware aqueduct (completed 1942) brings additional water from tributaries of the Delaware river to New York, already supplied in part since 1917 by the Catskill aqueduct, 126 m. long. In the Delaware scheme a single tunnel, from 17 to 19 ft. in diameter and 15 m. long, pierces the Shawangunk mt. Three shafts, 840, 825, and 1,551 ft. deep, were



Aquila, Italy. The 13th century façade of the church of S. Maria di Collemaggio

sunk at points 5 m. apart, in order to allow of simultaneous tunneling at a number of points. Rock tunnels are usually concreted to promote ease of flow: earth tunnels are concreted or bricked for the same reason. In undulating country and across valleys, sections of steel pipe-line are interposed.

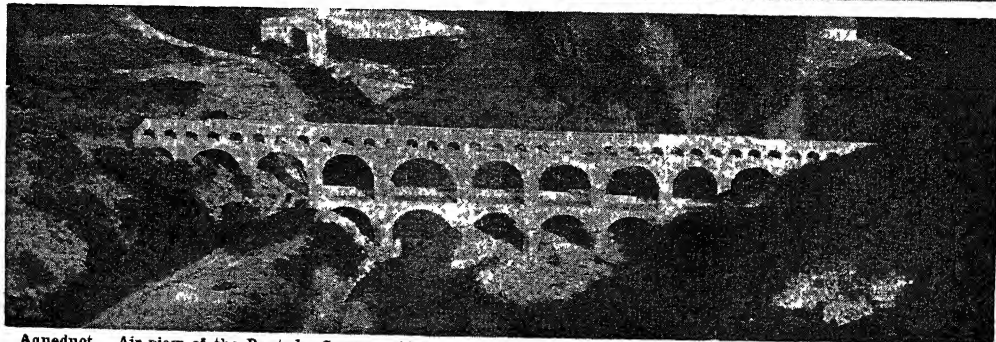
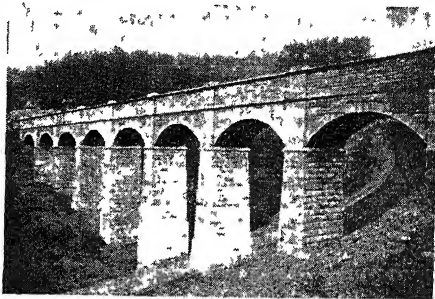
Aquifoliaceae. Small family of shrubs or trees having undivided, alternate, and often evergreen leaves. The flowers are small and white, in clusters (cymes) produced from between the base of the leaf-stalk and the twig. There are only five genera and about 300 species, natives of tropical and temperate regions. The common holly is a well-known type.

Aquila. City of Italy. The capital of Aquila province, it is on the Aterno, 50 m. direct and 145 m. by rly. N.E. of Rome. It is a summer resort, beautifully situated on a plateau at the foot of the Gran Sassa d'Italia. An archiepiscopal see, it has a 13th century cathedral and a citadel built by the Spaniards in 1534. Notable among

its churches are S. Bernardino di Siena, dating from 1472, and containing a finely sculptured tomb of the saint, and that of S. Maria di Collemaggio, built 1280, within which is the tomb of Pope Celestine V. Its chief industry is lace-making. It was founded by the emperor Frederick II about 1240. Razed by Manfred

twenty years later, it suffered further at the hands of the Spaniards in 1521 and the French in 1790. During the Second Great War, Allied troops of the 8th army, having crossed the Saline river, occupied the city June 13, 1944. Pop. 54,722.

Aquila (Lat., eagle). Name of a constellation in the northern hemisphere. Figured as an eagle carrying a harp about its neck, it is to the east of the star Vega and is traversed by a bright part of the Milky Way which here divides into two branches. Its chief star is Altair, occupying one of the angles of an equilateral triangle, the other two points being Vega and the star Alpha Ophiuchi. See Constellation



Aqueduct. Air view of the Pont du Gard (c. 18 B.C.) carrying the aqueduct that supplied Nîmes, France, across the valley of the R. Gard. Above right, Deepwood Dingle crossing of the Birmingham aqueduct

Aquila. An early convert to Christianity mentioned in the N.T. The husband of Priscilla, with whom he is always associated, he is referred to by S. Paul (Rom. 16; 1 Cor. 16; 2 Tim. 4). Born in Pontus (Acts 18) and a Jew, Aquila was driven from Rome, and with Priscilla entertained S. Paul at Corinth. Later they saved the life of the apostle at Ephesus. A late tradition makes Aquila one of the seventy sent out by Christ.

Aquilegia. Genus of perennial herbs of the natural order Ranunculaceae. Native of the N. temperate zone, it contains a few species and numerous hybrids. The leaves are broken up into stalked leaflets, which are again divided into three lobes. A familiar type is the common columbine (*A. vulgaris*), a native of Europe, Asia, and N. Africa,



Aquilegia vulgaris, or columbine

whose inverted flower is supposed to resemble a nest of five doves (Lat. *columbae*) or eagles (*aquilae*).

Aquileja. Small town of Italy, in Gorizia prov. In the Middle Ages it was known as Aglar. It stands 6 m. from the coast at the head of the Adriatic, 26 m. by rly N.W. of Trieste. From its foundation as a frontier fortress about 200 B.C. until its destruction by Attila in A.D. 452, Aquileja was one of the great cities of the Roman Empire, especially under the successors of Augustus. It was the nodal point of several roads, a station of the fleet, and a residence of the emperors, which combined to make it an important trading centre. At the close of the 4th century it was the ninth city of the Roman Empire.

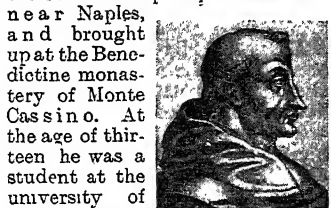
Excavations have proved its importance, and the museum contains a valuable collection of antiquities. The bishop of Aquileja attained the rank of patriarch and was one of the most important

dignitaries of the medieval Church. The archbishopric existed in what remained of the city after its destruction in 452, and, although once or twice removed, was not suppressed until 1751. Its cathedral, dating from the 11th century, occupies the site of an earlier edifice. It was remodelled in the Gothic style about 1380, and has a campanile 240 ft. high.

Since Roman times the sea has receded and the city is now about 6 m. away, lagoons having been formed in front of it. It was included for centuries in the Holy Roman Empire, and was acquired by Austria in 1806 and by Italy after the First Great War. Councils of the Church were held at Aquileja, in 351, 553, 698, and 1184. Parts of its ancient walls have been excavated and a few fragments remain of the imperial palace built during the 4th century. Pop. 2,600.

Aquin. Seaport of Haiti. It stands on the S. coast, 50 m. W. of Jacmel, and exports dyewoods. Pop. 22,000.

Aquinas, THOMAS (1227-74). Saint and theologian. A son of the count of Aquino, he was born near Naples, and brought up at the Benedictine monastery of Monte Cassino. At the age of thirteen he was a student at the university of Naples. Here three years later he became a friar of the Dominican order, notwithstanding the opposition of his family, and, proceeding to Cologne, attended the classes of Albertus Magnus, with whom he was sent to Paris for a three years' course at the university. He graduated in theology in 1248, returned to Cologne, and was ordained to the priesthood, lecturing and teaching in that city for the next four years.



S. Thomas Aquinas, scholastic theologian

When in 1252 Thomas went to Paris to take his doctor's degree, his fame as a theologian and a teacher was already established. But Paris was the scene of bitter controversy between the friars and the secular clergy, and the friars, heavily attacked by the latter, called Thomas and S. Bonaventura,

the Franciscan, to their assistance. The cause was argued before the pope, and Thomas's brilliant defence broke up completely the case against the mendicant orders. Thomas received the doctorate in 1237. From that time until his death he was teaching, writing, and regulating the theological studies of the Dominican friars. Beyond attendance in London at a general chapter of the order in 1263, and two years in Paris, 1269-71, he remained in Italy—at Rome, Bologna, and Naples—refusing all high appointments in the Church, and remaining a simple friar. Summoned by Pope Gregory X to attend the general council called at Lyons for the reunion of the Greek and Latin churches, he died at the Cistercian abbey of Fossa Nuova, March 7, 1274. He was canonised by Pope John XXII in 1323, and declared a doctor of the Church in 1567, and patron saint of all Catholic schools and colleges. His festival is kept throughout the Roman Catholic Church on March 7.

The influence which Thomas Aquinas has exercised on both theological and philosophical thought is enormous. His learning was considerable, and his intellect brought every branch of knowledge within his system of theology. In addition to several commentaries on books of the Bible, a philosophical treatise on Being and Essence, a Summary of Philosophy, which is mainly occupied with the discussion of natural religion, and commentaries on Aristotle, there remains the greatest of all his works, the Summa Theologica, a compendium of all human knowledge in its relation to religion.

He taught that for the human soul there were two sources of knowledge, divine revelation (supernatural) and human intellect (natural); and that all our knowledge begins with the senses. Philosophical, i.e. natural, knowledge could only be brought to its fullness by broadening into theology under the grace of divine revelation. The intellect discerning the good determines the will, the latter being thus dependent on the former, and freedom simply the liberty based on knowledge. Without knowledge of justice the will is not free to choose the just course. Theology, Aquinas taught, is organized knowledge of God. While reason can prove the existence of God, revelation shows the essence of God. The divine will is bound to the divine wisdom, and a thing does not become good because God wills it; but He wills it because His wisdom has recognized that it is good. From all this it follows that true doctrine is



Aquileja, Italy, showing the 11th century cathedral

the cause and basis of all right practice, and that the intellectual appreciation of God—that is, knowledge proceeding from divine revelation—is all-important. The indebtedness of Aquinas to Aristotle is very great. All that is true in Greek ethics has its place in the *Summa Theologica*.

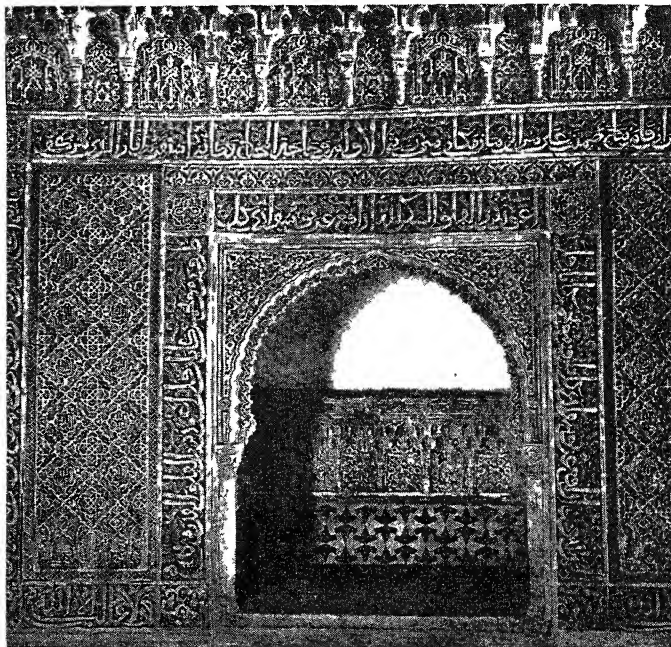
With Aristotle, Aquinas maintains that ethics is the science of directing the will to the real good, but he makes charity or love the central unity of the virtues. Today his great work is as essential to all students of theology as it was in the 13th century. The Fathers of the English Dominican Province are responsible for a complete and literal translation of the *Summa Theologica*.

Aquinas was a man of exceptional religious fervour and of simple piety. It was in 1263 that the festival in honour of the Holy Eucharist was, at the request of Aquinas, made by Pope Urban IV a feast to be observed throughout the Catholic Church, under the title of Corpus Christi. Thomas was deputed by the pope to compile the office for the festival, and his work includes the three greatest and best known hymns in honour of the Sacrament—*Lauda Sion, Verbum Supernum*, and *Pange Lingua*. All three, in translations, are often used at Holy Communion in Anglican churches.

Bibliography. *Summa Theologica*, 22 vols., 1909–22; *Summa Contra Gentiles*, 5 vols., 1924–29; Thomas Aquinas, *His Personality and Thought*, M. Grabmann, 1928; Thomas Aquinas, M. C. D'Arcy, 1930; St. Thomas Aquinas, G. K. Chesterton, 1933; *The Philosophy of St. Thomas Aquinas*, E. Gilson, 1937.

Aquitaine. Name given nearly 2,000 years ago to the district between the Pyrenées and the river Garonne. Gradually the name spread farther N., and in the time of Augustus the territory reached as far as the Loire.

After the fall of the Western Empire it was ruled by dukes, who were in practice independent, although nominally they were vassals of the Frankish kings. Charles Martel, however, recovered it, and Charlemagne gave it to one of his sons. In the 9th century a new line of dukes obtained authority over it. One of these, William, had a daughter Eleanor, who was the wife, first, of Louis VII of France, and, secondly, of Henry II of England. She was the heiress of Aquitaine, which thus became united with England, in whose possession it remained until the days



Arabesque. Part of the wonderful decorations in this style of the Hall of the Ambassadors in the Alhambra, Spain

of Henry VI. By then, the name Aquitaine had almost fallen into disuse, the S. part being known as Gascony and the N. as Guienne.

Aquitania. A Cunard liner, launched in 1913, and burning oil fuel. Gross tonnage, 45,647 tons; length, 868 feet; speed, 24 knots. Crew, about 580.

The liner performed useful service in the two Great Wars. In 1914 she was taken over as an armed cruiser, but was subsequently engaged on transport and hospital service, carrying upwards of 120,000 men, including 25,000 wounded. Between the wars she made 291 crossings of the N. Atlantic, and was at New York on Sept. 3, 1939. She returned to Southampton and was requisitioned for transport, operating in various zones until May, 1942; thereafter to the end of the war she carried troops across the Atlantic, in all 246,698 men.

Arabah, WADY EL. Valley in Transjordan. Known also as El Ghor, it extends from the S. of the Dead Sea to the N. end of the Gulf of Akaba, and is about 110 m. long; it is part of the Great Rift Valley which connects the Dead and Red Seas with Lake Tanganyika. On the E. is Mt. Seir.

Arabesque. Style of pictorial or plastic ornament, with some suggestion of the fanciful or grotesque. It is seen in Moorish

and Arabic architecture, and lent itself to beautiful patterns.

In music, arabesque was first applied by Schumann to one of his pianoforte pieces (op. 18) the form of which resembles a rondo. Debussy's two arabesques for piano (1888) are among his most popular pianoforte works. In dancing, the arabesque is a position in which the body is supported on one leg with the other extended behind, one arm outstretched in front, the other extended behind.

Arabi, AHMED (c. 1839–1911). Egyptian nationalist, known as Arabi Pasha. Born in Lower Egypt of fellah parents, he became an army officer in 1862, shortly afterwards joining a secret society for the overthrow of the khedive. He won popularity in the army by his speeches against the employment of foreigners and Turkish ministers in Egypt, and in 1882 forced himself upon the khedive, Tewfik Pasha, as war minister. His influence soon became supreme and he declared hostility to all forms of European control in Egypt. In reply the British bombarded Alexandria on July 11, 1882, and on Sept. 12 Sir Garnet Wolseley's forces defeated Arabi at Tel-el-Kebir. Arabi was condemned to death, but was sent to perpetual exile in Ceylon. Permitted to return to Egypt in 1901, he died there Sept. 21, 1911.

ARABIA: EARLY HOME OF LEARNING

Robert Machray and M. A. Canney

In this article are sketched the art, philosophy, language, etc., of the country as well as its history, with its renewed political importance in modern times. For further information see under Hejaz; Mahomedanism; Mecca; Nejd; Saudi Arabia, etc.

Called by its own people Jezirat-al-Arab, "the peninsula of Arabia," and by the Turks and Persians Arabistan, i.e. the land of the Arabs, Arabia is the great peninsula which forms the S.W. part of Asia.

AREA, BOUNDARIES, ETC. Its boundary on the N. may be taken as starting from the head of the Gulf of Akaba, and running S. and E. of Transjordan to Iraq and the Persian Gulf. On the W. it is bounded by the Red Sea, E. by the Persian Gulf and Gulf of Oman, and S. by the Gulf of Aden, Arabian Sea, and Indian Ocean. Approximately its area is 1,000,000 sq. m. From N.W. to S.E. it is about 1,800 m. in length. It is broadest on the S., its mean breadth being about 600 m. Vast portions are sandy wastes: on the N. is the Great Nefud, on the E. is the Little Nefud or Dahna, on the S.E. is the Ruba al Khali, and on the S. is El Ahkaf—all desert land with only an occasional oasis.

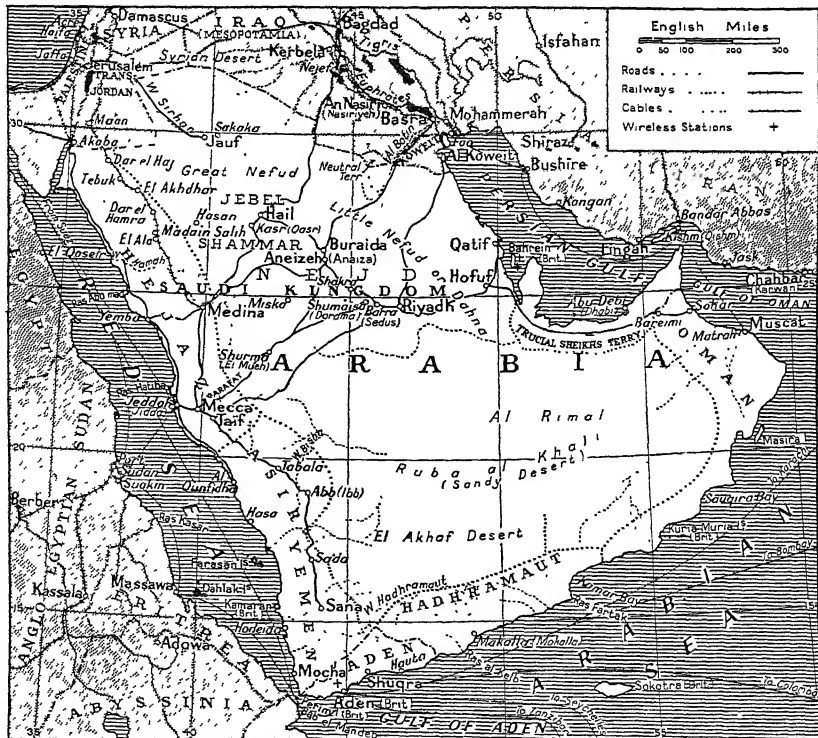
The mountain rim on the W. and the encircling deserts N.E. and S. isolate the central tableland of Nejd and Shammar; here are many hillocks and few hills. In the N., in Jebel Shammar, where the rock is granite, there are few oases; in the S.E. the limestone is more fertile and better watered; between the two in the sandstone is the comparatively fertile valley of Kasim. Throughout Nejd water can be obtained by digging, so that the area supports a relatively large population. Of the rivers no single stream flows all the year round. About half of the country is quite uninhabitable. Except in the

north-central regions inhabited Arabia consists of a series of states or more or less well-defined territories lying on the shores of the Red Sea, the Arabian Sea, the Gulf of Oman, and the Persian Gulf, their hinterlands being lost in the desert plateau, which on the N. is some 2,500 ft. and on the S.W. from 7,000 ft. to 9,000 ft. above the sea. Anciently Arabia was divided by Ptolemy into Arabia Petraea, which is the region in and about Petra, in the N.W.; Arabia Felix, i.e. the modern imamate known as the Yemen; and Arabia Deserta. The pop. is conjecturally put at 10,000,000. There are two strains of Arabs, one Ishmaelite, in the N., and the other Yektanic or Kahanitic, in the S., which derives from one of the descendants of Shem; both are Semitic. The Arabs in the S. consider their blood the purer. Roughly all are divided into two great classes—the Beduin or migratory Arabs,

who flit from oasis to oasis, and the Arabs who live in settled communities in Nejd, Shammar, and along the coast. The former have their tribal chiefs; the latter, with few exceptions, have independent or semi-independent princes.

Naturally the connexion between Arabia and Palestine-Syria has been intimate, and there are many Jews in the country, especially in the S. The most important political division is the kingdom of Saudi Arabia, which includes the Hejaz, Asir, and the great interior mass of Nejd. For the most part this is mountainous or plateau country, arid and uncultivated. Below this comes the Yemen, the best part of Arabia, where the monsoons yield a moderate rainfall, and below that is the British colony of Aden and the Aden Protectorate, casting its influence eastward throughout the Hadhramaut on the S. to Oman, an independent state in the S.E. Along the Persian Gulf, N.W. of Oman, come in order the territories of the Trucial Sheikhs; Hasa, part of Saudi Arabia; and Koweit, an Arab sultanate under British protection.

For the greater part Hejaz and Asir on the W. occupy the land



Arabia. Map of the great peninsula which forms the S.W. extremity of Asia

stretching back from the sea beyond the mountains that rim the central plateau. The narrow coastal portion of this tract, which in places is fairly thickly inhabited, is called the Tehama, or low-lying country, and is a hot and humid region, whose valleys produce maize, wheat, barley, cotton, coffee, sugar, tobacco, and indigo, and abound in spice and aromatic trees and plants. In Hejaz, inland of the mountainous plateau rim which here rises to over 8,000 ft., the Hejaz rly. runs parallel with the coast to Medina, and skirts the edges of the Nefud desert. In Nejd, Shammar, and on the S. and E. coasts the date palm supplies the chief means of subsistence. Arabia is famous for its horses and camels; the best of the former come from Nejd, of the latter from Oman. After the rainy season the Arabs move their flocks and herds into certain spaces of the desert plateau which have suddenly become green with rich vegetation, and for two or three months afford reasonably good pasturage.

The climate has extremes of heat and cold, the coastal tracts, particularly the littoral of the Persian Gulf, being in summer among the most torrid regions of the world. Wild beasts include the lion and the panther, but are not numerous, nor are there many birds. The country is not highly mineralised, though iron, copper, and lead are found. The Persian Gulf, on the Arabian side, has valuable pearl fisheries.

Arabia is very deficient in communications. There is only one railway—that part of the Hejaz rly. which runs from Transjordan to Medina, and this is not in working order (1947). A metalled road runs from Jeddah to Mecca and Medina. For the rest, motor transport follows the ancient caravan routes across the desert, from Mecca to Riyadh and the Persian Gulf to Hail and on to Iraq, to Medina and Transjordan and south into Yemen. In the world movements from E. to W. or from W. to E., no great armies ever traversed Arabia, and no vast migrations of peoples dropped settlers by the way.

Arabia has no large cities. The Hejaz contains Mecca and Medina, the holy cities of the Moslems, with the ports of Jeddah and Yembo; Asir has no town of importance; in the Yemen Hodeida has to some extent supplanted Mocha, both as a port and as the centre of the coffee trade; Sana



Arabia. Beduin camel driver. According to Arab tradition, the Beduins are descendants of Ishmael, while the pure Arabs are descended from Shem

is the capital. Muscat in Oman is almost the only town of any consequence from Aden to Koweit. In the interior are Hofuf, Riyadh, and Hail. The nature of the country forbids large aggregations of people in any part.

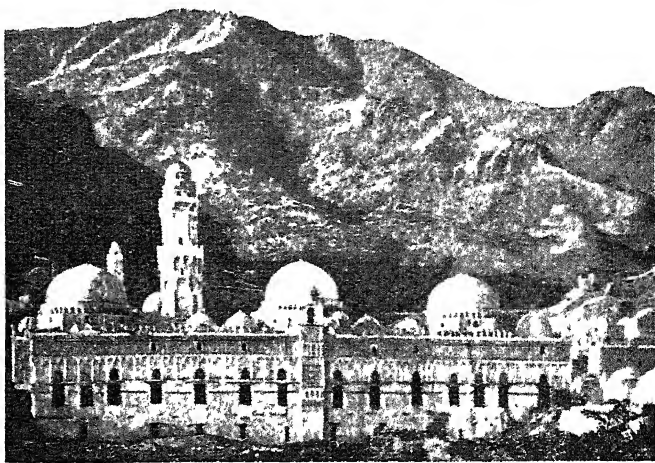
HISTORY. The Arabs are undoubtedly an ancient race, but until the advent of Mahomet and the development of Islam Arabia figured hardly at all in history. Unquestionably the deserts on the E. and the mountains on the W. that shut in the coastal tract, especially in the Hejaz, a word which itself means a barrier, precluded invasion or immigration on a large scale from either side, as was also the case with the inhospitable terrain on the N. For unnumbered centuries life proceeded with little or no change in the primitive patriarchal communities of the land. In the S.W.

there were some early attempts at organization. Such was the kingdom of the Sabaeans, traces of which go back to 700 B.C. and one of whose rulers probably was the queen of Sheba who visited King Solomon (1 Kings 10). Other such shadowy kingdoms of ancient times were those of the Minaeans and the Himyars, from whose period inscriptions survive.

On the extreme S.W., with Africa separated only by the narrow strait of Bab-el-Mandeb, there was some traffic with ancient Ethiopia, and the Abyssinians more than once crossed over and made conquests. The Romans tried to establish themselves in the country, but with scant success. In the first centuries of the Christian era Christianity made no mark on Arabia, the religious centre of which was then Mecca, as it is now. Mecca held the great

idol-house of the country, to which the tribes were wont to repair on occasion, their only other general meeting-place being Okaz or Okadh, near Taif, where an annual fair was held.

Early in the 7th century a wonderful change united the Arabs as never before. The Koreish tribe had charge of the idol-house, the Kaaba, at Mecca, and one of its members, disgusted with the idolatry of his countrymen, proclaimed the faith in the one God, whose prophet he asserted he was, which faith later was known as Islamism. This was Mahomet. In 612 he propounded his religion, and it soon became not only a religious but a powerful aggressive



Arabia. Typical scenes in the land of Mahomet, showing Menakha and Jebel (Mount) Shibam, in the Yemen, and (above) the beautiful mosque of Muzaffar at Taif, also in the Yemen, near the Aden frontier

political force, which originated the Caliphate and conquered large portions of Asia and Africa, as well as part of Europe. Nor was the conquest merely military and religious, for with it, in its best phase, went literature, art, and science. Under the Abbaside (*q.v.*) caliphs schools flourished as far apart as Bagdad and Cordova, and libraries were established at Alexandria, Cairo, and elsewhere.

The Arabs created the science of medicine, and the Arab Avicenna wrote the famous Canon of Medicine, which was the physician's first text-book. In mathematics and astronomy the Arabs excelled, and all this when Europe was passing through a period of declension and darkness. In the course of time the Arab conquest was undone, and the Turks squatted on its ruins, putting nothing in its place and blighting everything that escaped from the wreck. In the 16th century the Turks turned their attention to Arabia itself, and conquered the Yemen. During that period and in

the following century the Portuguese took Oman, and acquired a footing in the region of the Persian Gulf, which they eventually lost to the British, who captured Ormuz, or Hormuz, on the Persian side of the Gulf, from them in 1622. The 18th century saw the rise in Arabia of the Wahabi movement for reforming Islam.

The hold of the Turks on any part of Arabia was never very secure; the Yemen, for instance, was in a constant state of rebellion, and from 1891 Turkish rule was confined almost to a few places on the coast. For the pilgrim traffic to Mecca, and to consolidate her interests in the Hejaz, Turkey built the Hejaz railway, connecting Damascus with Medina, the latter city being reached in 1908. During the First Great War, the Hejaz under Hussein, grand sherif of Mecca, who adopted the title of king of the Hejaz, repudiated the authority of the Turks, and materially contributed to the success of the Allies. Before that war ended, the Arabs

on the W. had become united, and at the Paris peace conference the authority of Hussein was recognized. But his old rival Ibn Saud, king of Nejd and the Wahabis, made war on him and in 1925 drove him from his dominions. Ibn Saud who had overrun Shammar in 1921, in 1926 proclaimed himself king of the Hejaz, and in the same year reduced Asir to his suzerainty. Its complete incorporation in 1933 and the successful conclusion of a war with Yemen in 1934 made Ibn Saud ruler of most of the peninsula.

Bibliography. Arabia Deserta, C. M. Doughty, new edn. 1926; A Winter in Arabia (1942) and The Southern Gates of Arabia (1945), Freya Stark; Arabia (1930), Arabia of the Wahabis (1935), and A Pilgrim in Arabia (1946), all by H. St. John Philby.

LANGUAGE AND LITERATURE. The Arabic language is an offshoot of the original Semitic speech, and, owing to the comparative isolation of the Arabs of the desert, is related more closely to the prehistoric language of the Semites than any other of the Semitic languages. If Arabia was not the original home of the undivided Semitic race, it would seem to have been the centre from which the Semites radiated.

The earliest literary monuments of the Arabs have survived in a great number of Sabaeen or S. Arabic inscriptions, which since 1772 have been discovered, deciphered, and explained by European travellers and scholars. Many of these date from the 8th century B.C. The language is that which was spoken by the peoples of Yemen (Sabaeans, Himyarites, Minaeans, and others), who inherited an ancient civilization. It was superseded for the most part long before

Mahomet by the language of the ruder Beduins of the North.

The earliest Arabic writings that can be described as literature are the productions of the Arabian poets or minstrels. The oldest poems (5th century A.D.) were preserved for centuries simply by oral transmission. They were committed to memory and handed on by "reciters," who at first were attached to individual poets, but afterwards entered a wider field.

The custom of writing poetry did not begin until about A.D. 700 (i.e. towards the end of the first century after the Flight), when it was felt to be important to collect and preserve the utterances of the famous pre-Islamic poets. Several collections of these have come down to us. One of them is called the *Mu'allaqat*, or sometimes *The Seven Long Poems*. The Arabic name is derived from a root which has the idea of "hang up." Hence the familiar designation *Suspended Poems*, and the legend that the poems were hung up in or on the Kaaba at Mecca, as a precious thing is hung up in a treasury or storehouse. A more likely translation of the Arabic name is *The Pendants* (so A. Müller), the idea being that the poems were like a string of pearls. They were in fact called also "the necklaces of pearls." The authors were Amru-el-Kais, Jarafa, Zuhair, Labid, 'Amr ibn Kulthûm, 'Antara, and Al-Hârith ibn Hilliza. Another collection is called *The Diwans of the Six Poets*. The poets were Nâbigha, 'Antara, Jarafa, Zuhair, 'Alqama, and Amru-el-Kais. Nâbigha and the poet A'shâ rank with the greatest poets of the period. In the collection known as the *Hamâsa* of Abû Tammâm some of the poets belong to the early Islamic period.

Mahomet started his prophetic activity at about the beginning of the 7th century A.D. The Mahomedan period, which is dated from the Flight (Hegira) of Mahomet from Mecca to Medina in A.D. 622, saw the rise, efflorescence, and decline (A.D. 1258) of a remarkable literary activity, the impetus to which was provided by the Koran. To preserve and explain the text of the sacred book bequeathed to the Moslems by Mahomet, it was necessary to invent a science of grammar and lexicography, and to collect the pre-Islamic poems, the language of which provided Mahomet with his model. The language of the poets came to be regarded as classical Arabic, and it was this language that was spoken and written by cultured Moslems until the 13th century.

In the 13th century it had to give place in various Arabic-speaking countries (including Arabia) to a number of colloquial dialects.

The Koran was not committed to writing by Mahomet. The discourses of which it is composed were written down on palm-leaves, leather, stones, etc., by the companions and followers of the Prophet as they heard them. They were gathered up into something like what we know as the Koran soon after Mahomet's death. Subsequently, in 651 the caliph Othman ordered the preparation of a revised or standard edition. There gathered also about the Prophet a mass of tradition (*hadith*), a kind of table-talk, which was handed down at first orally

and was recorded later in books. One of the most ancient collections is that of Bukhârî (d. 870). This kind of material was embodied also in commentaries on the Koran, the most famous of which are those of Jabari (d. 923), Zamakhshârî (d. 1143), and Baydâwî (d. 1286).

The reigns of the caliphs Mansûr (754-775), Hârûn-al-Rashîd (786-809), and Mamûn (809-833) were marked by a kind of Oriental Renaissance. Literature, art, and science began to receive great encouragement, with the result that during some centuries a vast number of important and original works in all fields appeared, and many translations were made into Arabic from Greek, Syriac, and Persian. Thus the Arabs and semi-Arabs (many of the writers being half Persian) became, as R. A. Nicholson truly says, "pioneers of learning and bringers of light to medieval Europe."

About this time famous schools of learning sprang up at Bagdad, Basra, Bokhara, and Kûfa: and great libraries at Alexandria, Bagdad, and Cairo. Bagdad, where the caliph Al-Mamûn founded a university, is said to have attracted all the chief intellects of the empire. Mention may be made of some of the most important writers. There

were poets such as Abû Nuwâs (d. c. 810), Abû'l-'Atâhiya (748-828), Mutanabbî (915-65), and Harîrî (1054-1122), whose *Maqâmât* is considered one of the masterpieces of Arabic literature. The word *Maqâma*, meaning an assembly for literary discussion (French *séance*), is used to describe a new form of literature invented by Al-Hamad-hânî (d. 1007). The *Maqâmât* are written in rhymed prose, and are a mingling of philosophy and romance or fiction. Again, there were theologians such as the mystic Ghazâlî, who was surnamed "the Proof of Islam," and Shahrastânî (d. 1153), author of *The Book of Religions and Sects*. There were men of letters such as Ibn Qutayba (d. 889), author of a *Book of General Knowledge*, and Abulfaraj-al-Isfahânî, compiler of a great *Book of Songs*.

There were historians such as Ibn Ishâq (d. 768), who compiled the first biography of Mahomet; Jabari (838-923), who wrote a valuable history from the Creation to A.D. 915; Mas'ûdî, who has been called "the Herodotus of the Arabs"; Abulfaraj (d. 1289), who is also known as Bar-Hebraeus, the author of an *Epitome of Dynasties*; Abulfeda (d. 1331), who wrote an epitome of universal history; Suyûfî (1445-1505), who wrote a history of the caliphs; and Ibn Iyâs (d. c. 1524), who wrote a history of Egypt. Another famous historian of Egypt was Maqrîzî (1364-1442); and in Ibn Khaldûn (1332-1406) we have an example of the philosophical historian. Again, there were encyclopedists and dictionary-makers such as Al-Qazwînî, who in 1135 wrote a popular encyclopedia of a religious, moral, geographical, and historical character, and Ibn Khalikân (1211-82), whose *Obituaries of Eminent Men* is a great dictionary of biography. There were geographers such as Al-Idrîsî (b. 1099) and the famous Yâqût (1179-1229), who compiled a great geographical dictionary. There were philosophers such as Al-Kindî, who flourished at the beginning of the 9th century and was called "The Philosopher of the Arabs," Avicenna, and Averroes. There were scientists such as Al-Farghânî (Alfraganus), Abû Mas'har (Albuerhanus, d. 885), and Al Battânî (Albatagnius, d. 929). The fact that the words alchemy and algebra are Arabic indicates the great part that was played by the Arabs in the cultivation and spread of certain sciences.

The book so well known to Europeans as *The Arabian Nights* (Arabic *Alf Layla wa-Layla*, Thousand and One Nights) seems to have been based upon an old

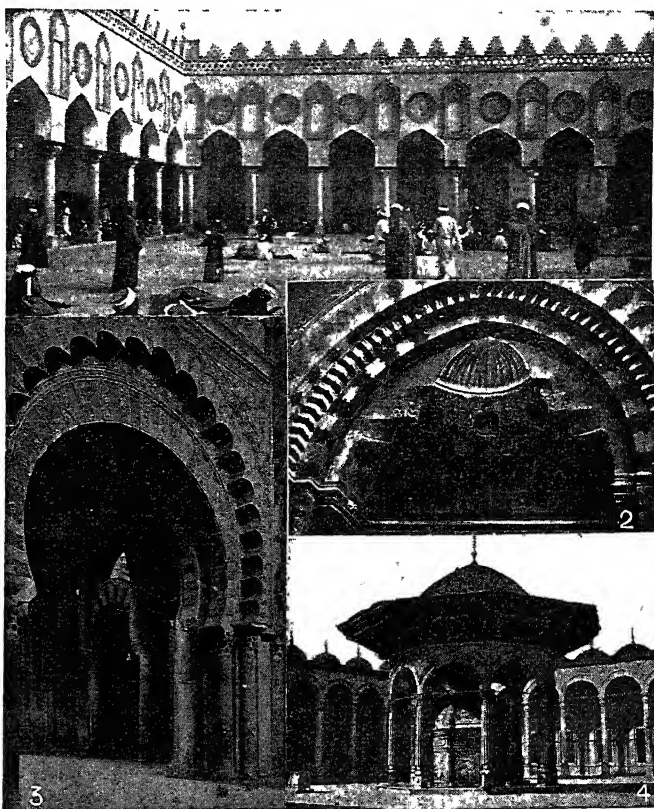
Persian book, *Hazâr Afsâna* (Thousand Tales). Another famous work containing fables, the *Book of Kalila and Dimna*, was translated from Persian into Arabic by the Persian *Ibnû'l-Muqaffa'* (d. c. 760). The original work, *Fables of Bidpai*, from which it was taken, was in Sanskrit. A third work well known to Europeans is the Romance of 'Antar. In its present form it is probably not later than the Crusades.

A considerable revival of Arabic literature took place during the 19th century. To some extent it followed traditional lines, but there were strong Westernising influences, fostered by progressives such as Mohammed Ali and Ismail Pasha. Numerous translations were made from the French. The new modernist tendencies found expression notably in the writers of Arab communities in America. Throughout the Arab world an Arabic press sprang into being, and attempts were made to establish an Arabic theatre.

The 20th century saw Egypt gradually acknowledged as the centre of Arabic culture. Modern authors set out to adapt the language to modern themes. Their chief means of publication was in the literary journals, and consequently short stories and essays have been the usual form of expression. Among novels, the best known are the autobiographical story *The Days*, by Taha Hussein, and *The Return of the Spirit*, by T. el-Hakim; both have been translated into European languages. In poetry there is a wide range of style, from the traditional to the ultra-modern, of which the Iraqi poet el-Zahawi is an example. A literary drama exists, in both poetry and prose, owing its origins to French symbolism.

Newspapers and books in Arabic are published in Egypt, Syria, Tunis, Algeria, and Morocco.

Arabian Architecture. Before the time of Mahomet the Arabs possessed no architecture of their own, and even when they overran Egypt, Syria, and Persia they relied largely on Byzantine and Persian workmen for their buildings. Hence the so-called *Architecture arabe* in these countries can hardly be considered to have been evolved from purely Arab inspiration. In its earlier stages it was distinguished by the use of the pointed arch; there remain mosques in Cairo and Damascus (A.D. 600-900) with this feature. Later the horseshoe arch was developed, and as the Mahomedan



Arabian Architecture. 1. Court of a mosque at Cairo. 2. Upper part of a gateway at Damascus. 3. Part of the interior of the Cathedral or Mosque, La Mezquita, at Cordova. 4. Fountain at the Mosque of Mahomed Ali, Cairo

influence spread, this became the characteristic mark of the several groups of Oriental architecture classified under the heading of Mahomedan Architecture (*q.v.*).

Arabian Nights' Entertainments, THE. Popular title of a collection of Oriental stories of undefined antiquity. The Arabic name, *Alf Layla wa-Layla*, is more literally rendered in the alternative titles, *A Thousand Nights and a Night*, or *The Thousand and One Nights*. Arabic writers of the 10th century refer to the work as a Persian one, but the name given to the first rendering of it into Western languages has permanently associated it with the Arabians. The scheme of the work by which the various stories are linked may be summarised thus: The sultan Schahriar, convinced that all women are faithless, has sworn to take a new wife every night and to have her slain the following morning. Scheherazade voluntarily becomes his wife, and by the telling of the tales wins respite from day to day, until after a thousand and one nights she wins her own security, and changes Schahriar's views.

In the form handed down, the stories are variously said to have been compiled for the daughter of the Biblical Esther, to have been borrowed by the Arabs from Persian or Egyptian sources, and to have been a series of tales added to from century to century. The last theory seems probable, whatever the country of origin may have been.

The work first became known in Europe when French translations of portions of it by Antoine Galland were published, 1704-17. Numerous English translations followed, but in 1841 E. W. Lane's translation, directly from the Arabic, was published and became the standard edition for most readers. Then in 1885-6 was published Sir Richard Burton's very full version, of which a popular edition, prepared by Lady Burton and Justin M'Carthy, was issued later. Many of the tales, *e.g.* those of Ali Baba and Sindbad the Sailor, have become as familiar to the western peoples as their own folk-tales, and several of them have for many years been again and again drawn upon in England to provide the slight framework of story for Christmas pantomimes.

Arabian Sea (anc *Mare Erythraeum*) That part of the Indian Ocean lying between Arabia and India. Its N W extension is the Persian Gulf through the Gulf of Oman, and its S W arm is the Gulf of Aden, connected with the Red Sea by the strait of Bab el Mandeb. It contains the Laccadives, the Kuria Muria Islands, and Socotra and receives the river Indus.

Arabin OR **ARABIC ACID** Chief constituent of gum arabic. It occurs combined with calcium, magnesium, and potassium. It is prepared by adding hydrochloric acid to a mucilage of gum arabic and alcohol afterwards, when the arabin is precipitated. Allied substances are cerasin or metarabic acid, prepared from cherry tree gum, and parabin, obtained from beetroot and agar agar. Arabinose ($C_5H_{10}O_5$) is a sugar obtained by the action of sulphuric acid on gum arabic or sugar beet pulp. It is a sweet tasting substance used as a bacteriological medium.

Arabis OR **ROCK CRESS** Genus of annual and perennial herbs of the large family Cruciferae. They are natives of the N temperate zone.



Arabis The Alpine rock-cress

The hairy basal leaves are spoon-shaped, and the four petals of the flower usually white or purplish. The Alpine rock cress (*A. alpina*) of Europe is a popular garden plant.

Arabistan. Province of Persia. Known also as Khuzistan, and in ancient times as Susiana, it lies between Luristan on the N and Farsistan and the Persian Gulf on the S, and has Iraa Arabi or southern Mesopotamia on the W. It is watered by the Karun, and Dizful is its chief town. It contains extensive deposits of oil, which are worked by the Anglo-Iranian Oil Company. The N part of the prov is hilly, the S fairly level. The pop is nomadic.

Arabkir OR **ARAFKIR** Town of Turkish Armenia, in the vilayet of Malatya. It is 100 m N W of Diarbekir, and was the scene of a massacre of the Armenians by the Turks in 1895. At that time its pop was 30,000. It trades in cotton goods, and is noted for fruit.

Arab League. The establishment of a league of independent Arab states was decided on at a pan-Arab conference held at Alex-

andria, Sept 25-Oct 7, 1944 when the representatives of Egypt, Iraq, Syria, Lebanon, and Transjordan signed a protocol to establish a league of Arab nations. Two other delegates those of Saudi Arabia and Yemen, not being empowered by their governments to commit themselves submitted reports respectively to King Abdul Aziz Ibn Saud and the imam of Yemen, who subsequently gave their approval. The other Middle Eastern Arab country, Palestine, at that time administered by the British under League of Nations mandate, was represented by an observer sent by the Palestinian Arabs. In Feb, 1945, a further conference approved a constitution for the proposed league, which came into being March 22, when a "pact of union of the Arab states" was signed.

The organization began to make itself felt as a political power in 1946-47 when it supported Egypt's claims to the Sudan against Gt Britain. Then, in Sept, 1947, it declared it would fight for Palestine, in support of the Palestinian Arabs, and, after the U N had accepted the partition plan for that country in Nov, it began military operations. At first successful, these took late in 1948 an unfavourable turn, and the league lost its cohesion when its member countries began to discuss individual armistice terms with the state of Israel. Other sources of internal weakness arose from the contrasting attitudes of Haj Emrn el Hussein (*qv*), the ex-mufti of Jerusalem, and King Abdullah of Transjordan, of whose ambitions the other members of the league were perennially suspicious.

Arab Legion. Police force of Transjordan, later becoming a military formation. Raised in 1926, under Lt Col F G Peake, it was soon called on to deal with tribal raiding, and was divided into two sections. One was detailed for duties in settled areas, the other, a desert patrol, was formed under Major (later Brigadier) J B Glubb (*qv*). In 1939, on the retirement of Peake Pasha, Glubb succeeded to the command of the entire legion. During the Palestine troubles of 1936-38, the desert patrol helped to keep Transjordan clear of rebel activities.

When the Second Great War started, a mechanised regiment was formed from the patrol and placed by the emir of Transjordan at the disposal of Britain. It carried out desert reconnaissances

and protected lines of communication. In 1941 Major Glubb went with some of the legion to rally the Iraqis who were hostile to Rashid Ali in Iraq. Squadrons of the mechanised regiment guided the "Kingeol" flying column (under Brig J J Kingstone) across the desert from the Mediterranean to the Euphrates in May 1941, when this column relieved the R A F force encircled in the Habbaniyah aerodrome. Later the regiment gained distinction in actions against the Vichy French forces in Syria. For later history see NV.

Arabs. Southern stock of the Semitic race. It includes strictly the nomad N Arabian or Beduin tribes and the tribes which have settled in the S of Arabia, especially Yemen. The term is used in Egypt and elsewhere in N Africa for any people professing Islam, and by extension has become a general designation for most living Semites who are not Jews. In remote times Arabs crossed to Abyssinia (Gen 2). The introduction of Islam, AD 622, led to new migrations which within a century had flowed over N Africa into Spain and France, while others founded an empire in India, and voyaged to the Malay and African coasts. Similarly the nomad Beduin spread over what is now Iraq. Such a history has resulted in the physical characteristics of the Arabs now presenting wide variations, especially as in Africa they have intermarried freely alike with Hamitic (Berber) and with Negro stock. Only in Arabia itself, where they may number 10,000,000, have they bred more or less to uniform type.

They are dolichocephalic (long headed), black haired, scantily bearded, lithe, muscular, fine featured, averaging 5 ft 4½ ins, whereas the S Arabian is usually straight nosed, the Beduin tends to the aquiline. They are courageous, temperate, imaginative, and passionately fond of poetry. Other attributes appear contradictory: the Arabs are generous and hospitable to guests (anyone who has eaten a tribesman's salt is safe for four days) but in business are parsimonious and will cheat and lie for the pleasure of it. Normally chivalrous, they can also be savagely vengeful. Despising haste while dwelling inland, transplanted to the coast they become adventurous seafarers.

The social organization has preserved its rigid patriarchal form throughout, hence their brief empires invariably yielded to those



1 Beduin woman 2 Water seller at Soheiya coastal town of the Yemen peninsula 3 Beduin of the desert 4 Bagdad porter applying the glazing mixture to a bowl 5 Young pupils of a desert school, each with his

copy of the Koran 6 Dignity and grace distinguish these Arabs of a higher social class in Amara 7 Three natives of Bethlehem 8 Cobbler of Bagdad 9 An Arab chief dispenses hospitality in his tent

ARABS - REPRESENTATIVE TYPES FROM THE NEAR AND MIDDLE EAST

Photos 1 and 8 R Gorbold 2 D McLeish 4 Major W J P Rodd 6 C Kemp 9 Underwood

of more versatile Aryan character. Under monotheism they have given the world an intense poetry and a profound religious philosophy. Except for mathematics, the scientific concerns of the western world have drawn little response from them. Their medicine and surgery are mostly barbaric and tolerable only among people of stoical endurance. Mechanics and classified experiment are outside their purview. Women are regarded as natural inferiors to men, perform all the work, and are usually married in adolescence. Arabs live mainly on dates, other fruit as obtainable, milk, butter, bread, and mutton, and drink coffee. The Beduin economy is based upon the camel. See Arabia: Islam.

Aracajú. A town of Brazil. The capital of Sergipe state, it stands on the Cotinguiba, 7 m. from the Atlantic, and is connected by rly. with the interior. It has iron foundries, manufactures soap and cloth, and exports sugar, brandy, cocoa, coffee, cotton, salt, and hides. Pop. 59,460.

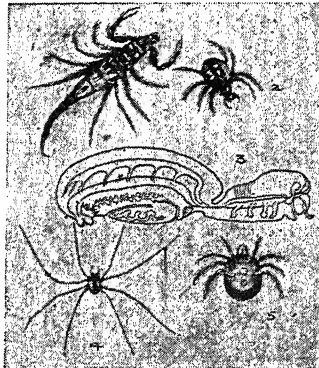
Aracaty. City and port of Brazil. In Ceará state, it stands on the Jaguaribe, 8 m. from the Atlantic and 75 m. S.E. of Fortaleza. It exports cotton, hides, rubber, and palm wax. Pop. 9,000.

Araceae (Latin *arum*, wake-robin). Family of herbs and climbing shrubs possessing poisonous properties. Mainly natives of tropical countries, a few occur in temperate and even cold climates. The rootstocks are tuberous and contain starch. The small simple flowers are clustered around a common support called a spadix, and protected by a cowl-like envelope called the spathe. There are about 100 genera and at least 1,000 species. See Wake-Robin.

Arachnida OR ARACHNOIDEA (Gr. *arachnē*, spider; *eidōs*, form). A class of the zoological phylum Arthropoda, to which the crustaceans and insects also belong. It includes spiders, scorpions, harvestmen, mites, and certain other animals. They have usually six pairs of limbs, of which four pairs are walking legs, the others being used for seizing food and conveying it to the mouth. The head and thorax are fused together, not separate as in insects, and the eyes, unlike those of insects, are generally simple. The abdomen is in some genera segmented, and may or may not bear appendages. In the scorpion its extremity is developed into a sting connected with a poison bag. The sexes are always separate, and nearly all the arachnids are car-

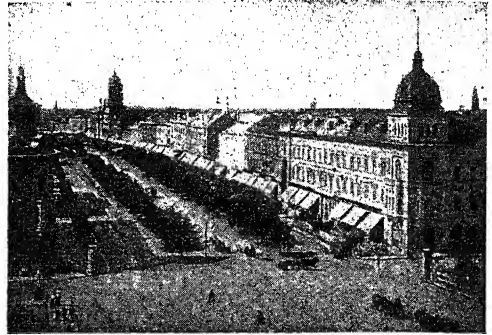
nivorous. (See Spider.)

The fossil forms of Arachnida belong chiefly to the marine orders Xiphosura and Eurypterida. Of the former the king crab is the only living representative. Similar forms appeared in the Silurian system, but reached their maximum in Coal-Measure times, the chief genera being *Belinurus* and *Prestwichia*. *Limulus* made its first appearance in the Triassic rocks. The Eurypterids are all extinct and their remains are found only in



Arachnida. 1. Scorpion. 2 and 3. Common garden spider, and enlarged section of same. 4. Harvestmen. 5. Water-mite. 4 and 5 greatly enlarged

the Palaeozoic rocks. In many respects they resemble the scorpions. They lived mainly in Silurian and Old Red Sandstone times, and occasionally attained great size. The scorpions are



Arad. General view of one of the chief thoroughfares of the capital of Arad county in the Hungarian plain

represented by fossil forms from the Silurian rocks of Gothland, S. Scotland, and N. America, from the Carboniferous of Scotland, of the Midlands, and of N. America, and from the Trias of Warwickshire. A few fossil forms are found in the Tertiary rocks of Prussia, usually preserved in amber. See Fossils.

Arachnoid Membrane. Very thin layer of tissue which covers the brain and spinal cord. It lies between the *dura mater* or outermost covering of the brain and spinal cord and the *pia mater* or inmost covering. See Brain.

Arachosia. A province of the ancient Persian and subsequently Macedonian empires. Known to the Parthians as White India, it now forms part of Afghanistan.

Arad. Two towns of Rumania, formerly in the kingdom of Hungary, both on the Alföld. Arad, the capital of Arad county, is a municipality on the right bank of the river Maros, 74 m. by rly. E. of Szeged. It is the seat of a Greek Orthodox bishop, is an important rly. and trade centre, manufactures leather and machinery, and has trade in cattle, flour, and grain. It was captured by the Hungarians



Arafat. View of the Arabian granite hill, known as Mount Arafat, and as the Mountain of Mercy, which stands about 15 m. S.E. of Mecca

in the war of independence, July 1, 1849. Here the Hungarian patriot Kossuth abdicated in favour of Görgei, Aug. 11, 1849. Liberty Square contains a monument to the 13 Hungarian generals shot by order of the Austrian commander Haynau, Oct. 6, 1849. Pop. est. 82,882. Arad co. extends N. from the Maros.

Uj-Arad or New Arad, in Temes county, now called Aradul Nof, is a smaller town on the left bank of the Maros, opposite Arad.

During the Second Great War railyards and repair shops at Arad were bombed by U.S. Italian-based planes, July 2, 1944. German and Hungarian forces in occupation of the town retreated towards the Hungarian plain



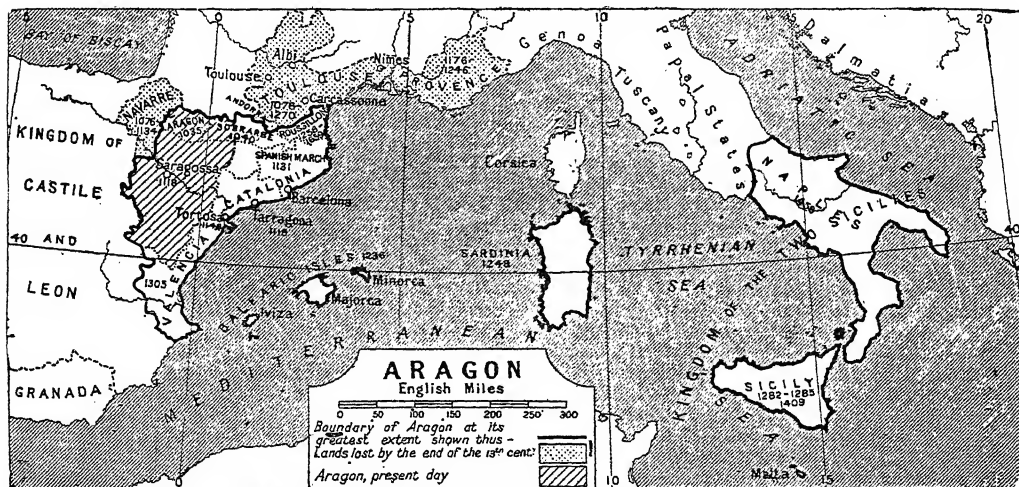
Arago

as Formentera the measurement of the arc of meridian between Dunkirk and Barcelona. In the Spanish rising of 1808, he fell into the hands of the insurgents, and did not recover his freedom until 1809. Soon after he was appointed professor at the École Polytechnique in Paris, and in 1830

Feb. 26, 1786, he entered the École Polytechnique in 1804, and was made secretary of the Bureaux des Longitudes in 1805. With Biot he continued as far

It was bounded N. by the Pyrenees, E. by Catalonia and Valencia, S. by Valencia, and W. by Castile and Navarre. Today it is covered by the provinces of Huesca, Saragossa, and Teruel. The Ebro flows through it and in it are the highest summits of the Pyrenees. Its capital is Saragossa (Zaragoza).

Aragon was one of the states that arose with the conquest of N. Spain from the Moors. It seems certain that in the 11th century a small part of it, the northern, was ruled by Sancho the Great of Navarre, while the remainder was in the Moorish kingdom of Saragossa. When Sancho died in 1035 his realm was divided among his sons, of whom Ramiro fought against the Moors and Castilians, by whom



Aragon. Map of the ancient kingdom which was later incorporated in the kingdom of Spain

shortly before Soviet and Rumanian troops entered the town on Sept. 22, 1944.

Araf OR **AL ARAF**. Mahomedan purgatory. It is described in the seventh chapter of the Koran as a wall or partition separating Paradise from Hell, into both of which those placed thereon can look. See Mahomedanism; Koran.

Arafat OR **JEBEL-ER-RAHM**. A hill in Arabia. It is known as the Mountain of Mercy, and is an object of pilgrimage to Moslems. It is about 200 ft. high, and lies 15 m. S.E. of Mecca.

Arafura Sea. Shallow sea in the E. Indies. It lies between the Northern Territory of Australia and the W. portion of New Guinea, and contains some easternmost islands of the Malay Archipelago.

Arago, DOMINIQUE FRANÇOIS (1786-1853). French astronomer. Born at Estagel, near Perpignan,

director of the Paris Observatory. He worked out theories of light, polarisation, galvanism, and magnetism.

In 1831 Arago was elected to the Chamber of Deputies as an extreme republican; he spoke there on education and the importance of scientific inventions. At the revolution of Feb., 1848, he became a member of the provisional government, holding the joint ministries of marine and war. On the *coup d'état* of Louis Napoleon, 1852, Arago declined to take the oath of allegiance and resigned the post of astronomer. Napoleon refused to accept his resignation and excused him the oath. He died in Paris, Oct. 2, 1853. *Consult* History of My Youth, Eng. trans. B. Powell, 1855.

Aragón. Name of one of the kingdoms into which Spain was divided before its union under Ferdinand and Isabella in 1479.

he was slain in battle. His son and successor, Sancho, maintained the war, extending Aragon at the expense of the Moors. The victory of the next king, Pedro, over Moors and Castilians in 1096, legend says, was mainly due to the intervention of S. George, and from then the kings of Aragon had as their device S. George's cross upon a silver shield.

Alphonso the Battler, who began to reign in 1104, married a daughter of the king of Castile and Leon and claimed those kingdoms. He could gain no foothold and, having divorced his wife, he turned against the Moors. He took Saragossa after a long siege, but was killed and his army routed.

As Alphonso left no sons, he bequeathed Aragon to the Templars and Navarre to the Knights of S. John. The people of both states objected; in 1134 the Aragonese

chose his brother Ramiro as king. Another period of conquest then began. The Moors were driven from Catalonia, and the boundaries of Aragon extended to the coast, taking in Barcelona. James the Conqueror took the Balearic Islands from the Moors and in 1238 reduced Valencia. With the accession of his son Pedro in 1276, Aragon began to take part in the affairs of Italy. Pedro's wife was heiress to Sicily, and the people of that island implored his aid against the French. In 1282 he sailed from Barcelona, was proclaimed king, and defeated the French by sea and land. After a brief separation Aragon and Sicily were again united under James in 1291, but almost at once the island was yielded to Charles of Anjou.

James also ruled the Balearic Islands and Roussillon, while in Italy he held the two Sicilies. Roussillon and the islands did not pass to his son Pedro III, but under Pedro IV (d. 1387) they were again ruled by a king of Aragon. Pedro III passed his reign of 50 years in struggles with his nobles and in warfare with Genoa for the possession of Sardinia. Martin (1395-1410) spent time and money in attempts to secure Sicily and Sardinia, and on his death without sons civil war broke out in Aragon. In 1412 three deputies each from Aragon, Catalonia, and Valencia met and voted on the monarchy. Fernando, grandson of Pedro IV and also a prince of Castile, secured a majority, captured his competitor, and, ascending the throne, prepared the way for the union of Castile and Aragon.

His brother Alphonso was chosen by Joanna, queen of Naples, as her heir. On his first expedition he drove the French from the city, but on the second his fleet was destroyed and he himself taken. Released, Alphonso defeated the French and Genoese, afterwards persuading the pope to recognize him as king of the two Sicilies, i.e. Naples and Sicily. His brother John was principally troubled by his Catalan subjects, who revolted against him, but the great event of the reign, which ended in 1479, was the marriage of his son Ferdinand to Isabella of Castile, 1469, and the foundation of the kingdom of Spain.

The constitutional history of Aragon is of interest, for one reason because it anticipates that of England. In the 12th century or earlier it had its Cortes, in which the communes were represented, and its justiza was an

official whose powers included the right to review the king's actions. Powerful nobles claimed that their privileges were independent of the king's grant or favour, but the people as a whole appealed often with success to ancient customs.

Aragon, Louis (b. 1895). French poet, novelist, and essayist. One of the founders of surrealism (q.v.), he afterwards became leader of a new movement whose manifesto he issued, *Pour un Réalisme Socialiste*. He was prominent in the management of the monthly *Commune*, the review *Europe*, and the daily *Ce Soir*. In the Second Great War he served with the French Tank div., 1939-40, and was decorated for gallantry. Taken prisoner by the Germans, he escaped, and, back in France, joined the resistance movement, writing under the name of *Francon la Colère* for the *Editions de Minuit*. Aragon's most enduring work is in his novels, of which *Les Beaux Quartiers* won the *Prix Renaudot*. Of his poetry, *Feu de joie*, *Le Crève-cœur*, *Persécuteur*, *Les Yeux d'Elsa*, and *La Diane Française* are typical.

Aragona. Town of Sicily, in Girgenti province. It is 7 m. by rly. N.N.E. of Girgenti, and has an old castle containing some fine paintings, and sulphur mines. Near is the small mud volcano, *Maccaluba*, 138 ft. Pop. 15,901.

Aragonite. Carbonate of calcium. It is of similar composition to calcite, but differs in having orthorhombic crystalline form. It is found in nature deposited from solutions and is extensively secreted by marine mollusca and other organisms, e.g. corals and algae, to form their calcareous shells and skeletons. It was first found in Aragon.

Aragua. A state of N. Venezuela. It lies between Miranda and Carabobo states, and is bounded on the N. by the Caribbean Sea. It produces cattle, coffee, sugar, tobacco, cocoa, and cotton. Cap., Maracay. Est. pop. 129,746.

Araguaya. River of Brazil. Rising in the Serra do Cayapó, it flows N.N.E. for 1,100 m. to the Tocantins, whose chief tributary it is, entering that river at São João. Known in its upper reaches as the *Rio Grande*, it bifurcates towards the middle of its course, the two branches, which form the island of Bananal with an area of 8,000 sq. m., uniting again about 100 m. lower down. Navigation, which is confined to small steamers, is obstructed by rapids.

Arakan. Division of Lower Burma. It covers nearly all the W. seaboard of the country, from the Naaf estuary bordering Chittagong to a point S. of Gwa. About 350 m. from N. to S., it varies in breadth from 90 to 15 m. The Kaladan, also called the Arakan, is the principal river. Akyab is the capital, a port 50 m. S.S.W. of the ancient city of Arakan, now called Myohaung. The people are Burmese Buddhists. The country, once independent, was seized by Aungmye; settled by Portuguese; conquered by Burmese, 1782; ceded to Great Britain by the treaty of Yandaboo, 1826. The Arakan Hill Tracts became in 1930 an organized territory under a superintendent responsible to the commissioner for Arakan. The Arakan Mts. run from the S. border of the division down the coast to the Bassein river. The Arakan Yoma are a central range which in places forms the boundary with Magwe; Mt. Victoria in the N. rises to 10,400 ft. Monsoon rainfall is excessive.

At the end of April, 1942, Arakan was overrun by the Japanese. On Dec. 19 British and Indian troops crossed from India into Arakan and advanced towards Akyab. Repeated raids smashed Japanese communications, and fighting raged for months along the Maungdaw-Buthidaung road. A powerful offensive was launched by the 14th army in Jan., 1944, and on March 13 it was announced that British and W. African troops had made successful landings on the Japanese coastal flank. With the capture of Akyab, Jan. 3, 1945, the Japanese threat to India was finally removed. Five landings within a month were made by the 15th corps (supported by naval and air bombardment) along the Arakan coast, and on Feb. 2 troops of the same formation occupied Kangaw, the last Japanese strong-point in the coastal area. The taking of Taungup, on April 16 marked the end of the Arakan campaign, which had been fought through two monsoons. See *Burma Campaign*.

Araki, Sadao, Baron (b. 1877). Japanese soldier and politician. Born in Tokyo, of Samurai descent, he spent his early years in poverty, working in a soya bean factory, but subsequently entered the army and fought in the Russo-Japanese war, 1904-5. During the First Great War he was attached to the Japanese military mission in Moscow and closely identified

himself with the Japanese imperialist party, though vehemently proclaiming his country's pacific intentions. Minister of war 1931-33, a member of the supreme war council, 1934-36, he resigned after army mutineers attempted to assassinate the civilian cabinet in 1936. In 1937-1938 he was a member of the supreme cabinet council. Tried before the international military tribunal in Tokyo, 1946, he was condemned in 1948 to life imprisonment. His chauvinist attitude was set forth in his book, *New Japan's Mission*.

Araktcheyev, ALEXIS ANDREYEVICH, COUNT (1769-1834). Russian statesman. Under Paul I he was set to reorganize the Russian army, but was dismissed in 1799 owing to hostility to his methods of discipline. Inspector-general of artillery from 1803 under Alexander I, he brought the army to a high state of efficiency. He retired in 1826 and died May 3, 1834, leaving 25,000 roubles to be awarded to the author of the best life of Alexander I.

Aral, SEA OF. Large inland sea or lake of Soviet Central Asia. It derives its name from the Khirgiz *Aral Denghiz*, meaning the island sea. Lying in the Aral Caspian lowlands, it is separated from the Caspian Sea by the Ust-Urt plateau. It has a greatest length of 235 m., extreme breadth of 180 m., and a depth varying from 50 ft. to 220 ft. It covers an area of 26,000 sq. m., which is continually decreasing by evaporation. Slightly saline, it contains a variety of fish, sturgeon, carp, and herring abounding. Seals are also caught. It is fed by the Amu-Daria and Syr-Daria, but has no outlet. The world's fourth largest lake, it freezes in winter for some distance from its shores.

Araliaceae. Family of climbers, shrubs, and trees. They have alternate leaves and regular flowers clustered in umbels or heads, and succeeded by berry-like fruits containing one or more seeds. There are 55 genera, including about 700 species. The order gets its name from the rice-paper plant (*Aralia papyrifera*), but a better known example is ivy (*Hedera helix*).

Aram OR ARAMAEA. Semitic name for Mesopotamia and part of Syria. Its vernacular was Aramaic or Aramaean, the language commonly spoken in Palestine in the time of Christ. See Aramaic Language.

Aram, EUGENE (1704-59). An English philologist and murderer. Born at Ramsgill, Yorkshire, he was the son of a gardener. En-

tirely self-educated, he became a schoolmaster at Knaresborough, but had to leave in 1745 under suspicion of being associated with frauds perpetrated by Daniel Clark, a shoemaker, who had secured possession of valuable property and then mysteriously disappeared. Subsequently a man named Houseman was arrested for the murder of Clark, and on his stating that Clark had been murdered by Aram and his body hidden in S. Robert's Cave, Knaresborough, search was made, the skeleton was found, and in Aug., 1758, Aram, then an usher at a school at Lynn, in Norfolk, was apprehended. Tried at York, Aug. 3, 1759, with Houseman the only witness against him, Aram defended himself with great skill, chiefly by insistence on the fallibility of circumstantial evidence. He was condemned, however, and executed on Aug. 6, before his death first attempting suicide, then confessing his participation in the crime, though maintaining that Houseman was the chief murderer. The body was hung in chains at Knaresborough.

In his spare time Aram had acquired amazing knowledge of Latin, Greek, Hebrew, French, Arabic, and Celtic, which he intended to utilise in the compilation of a great comparative dictionary. To Aram belongs the credit of discovering the affinity of Celtic to the other Indo-European languages. The case of Eugene Aram is the subject of Lord Lytton's novel of the same name and of Hood's *Dream of Eugene Aram*. Consult *The Genuine Account of the Life and Trial of Eugene Aram*, W. Bristow, reprinted 1832.

Aramaeans. A branch of the northern stock of the Semitic race. Aram or highland is a personal name in Gen. 10, 22, son of Shem; the Hebrews claimed descent from "a nomad Aramaean" (Deut. 26. 5).



Araliaceae. *Panax quinquefolium*, or ginseng, the root of which is used by the Chinese as a tonic or stimulant

They began to wander from their Arabian grasslands about 1350 B.C., and dominated the uplands from the Euphrates to the Lebanon. After breaking up the Hittite confederacy, their hold on the caravan routes gave them control of the commercial intercourse between Babylon and the Mediterranean. Syrians who adhered to the old pagan religion were called Aramaeans by Syrian Christians.

Aramaic Language. Branch of the Semitic family of languages. Originally spoken by the inhabitants of Aram, in early times it extended over a wide area, and during the siege of Jerusalem by Sennacherib, the officers of Hezekiah asked the Rabshakeh: "Speak, I pray thee, to thy servants in the Syrian (i.e. Aramaic) language, for we understand it, and talk not with us in the Jews' language (i.e. Hebrew) in the ears of the people that are on the wall" (2 Kings 18). In Babylonia, Assyria, and part of Persia it was the official language, and was used in Syria, Cappadocia, and also in Palestine. The Galilaean dialect, not the cultivated literary language of Jerusalem, was used by Christ and the disciples. Documents extant in this dialect include the Aramaic portions of the Palestinian Talmud. Up to the 6th century B.C. the alphabet used by the Aramaeans was the old Semitic, after which special local forms of the letters came into use. Some Aramaic papyri found in 1904 in Elephantine, an island in the Nile opposite Assuan, have language akin to that of the Aramaic portions of the O.T. and dating from the period 494-405 B.C. They contain a translation of part of the Behistun inscription of Darius; also an appeal to Bagoas, the Persian governor of Judaea, for help against the Egyptians. There are two main dialects of Aramaic: (1) Western, comprising Palmyrene and Nabataean, known only from inscriptions; Biblical Aramaic (wrongly called Chaldean), in which parts of Daniel and Ezra were written; the dialect of the Targums and the Samaritan version of the Pentateuch; (2) Eastern, including Syriac, the literary language of the Syrian Christians of Edessa, which split up into Jacobite and Nestorian. of the Gnostic Mandaean in lower Babylonia and of the Babylonian Talmud.

After the rise of Islam Aramaic mainly gave place to Arabic, and is now only spoken near Damascus, among the Jacobites of the mountains of Turabdin in Meso-

potamia, by the Nestorians of Mosul, and on the banks of Lake Urmia, Persia. In a literary sense it is inferior to Hebrew and Arabic, being poorer in vowel-sounds and grammatical forms. On the other hand, the variety of its constructions renders it specially suitable for translation purposes. *Consult* Grammar of Vernacular Syriac. A. J. Maclean, 1895.

Aramis. Character in *The Three Musketeers*, a novel by Alexandre Dumas. Little more than his name was found in the *Memoirs of D'Artagnan* on which Dumas based the romance. Aramis bears but an assumed name, his true one being known only by his captain. He is the least aggressive of the great trio, who also appear in *Twenty Years After* and *The Vicomte de Bragelonne*. Aramis finally enters the church. *See* Athos: Porthos.

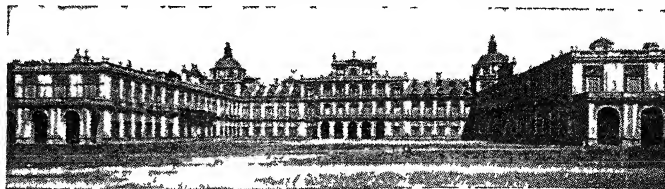
Aranda, PEDRO PABLO ABARCA DE BOLEA, COUNT OF (1718-99). Spanish statesman. He served as colonel in the War of the Austrian Succession, and was made governor of Valencia in 1763. In 1766, when disturbances in Madrid had driven Charles III from the city, he sent for Aranda to restore order and made him president of the council and captain-general. For seven years chief minister in Spain, he carried out administrative reforms, and expelled the Jesuits. Ambassador in Paris, 1773-87, in 1792 he was again prime minister, but his sympathies with the French Revolution soon procured his dismissal. He died Jan. 9, 1799.

Arandora Star. Blue Star liner (15,000 tons). On July 2, 1940, while carrying 1,500 German and Italian internees from Britain to Canada, with a crew and guards numbering 500, she was torpedoed and sunk by a U-boat in the Atlantic, W. of Ireland. About 1,000 survivors were landed at a Scottish port.

Aran Islands (OR ARRAN). Three small islands of Galway, Eire. Known also as South Aran Islands, they stretch across the entrance to Galway Bay and have an area of 18 sq. m. The largest and northernmost is Inishmore or Aranmore, the middle island is Inishmann, and the smallest is Inisheer. The surface ends in precipitous cliffs attaining 354 ft. in Inishmore. Archaeological remains

abound, notably Dun Angus, a remarkable round cyclopean fortress on Inishmore. On this island, still known as Aran-na-naomh, or Aran of the Saints, are several shrines and altars of the religious recluses who once inhabited it. Mackerel fishing is the chief occupation.

Aranjuez (Latin *Ara Jovis*, Jupiter's altar). A town of Spain, in



Aranjuez. Former royal palace of Spain, 29 miles from Madrid. It was built by Philip. and altered and enlarged by successive sovereigns

Madrid province. It stands on the Tagus, 29 m. S.S.E. of Madrid on the rly. Its splendid royal palace, now destroyed, standing in one of Europe's most beautiful parks, was a favourite seat of several Spanish sovereigns. The scene of Schiller's *Don Carlos* is laid here. The town was the scene of a treaty with France in 1772 and another in 1805, and of the insurrection which caused the abdication of Charles IV, on March 19, 1808. Pop. 14,000.

Aran Mawddwy. Mt. of Merionethshire, Wales. It is the summit of the Berwyn range, and is 2,970 ft. high. To the N. is Aran Benllyn, 2,901 ft. high.

Arany, JANOS (1817-82). Hungarian poet. The son of peasant folk, he was educated at the college at Debreczin, joined a company of strolling players, and then settled at Szalonta as a notary. In 1845 he obtained with his satire *The Lost Constitution* the prize offered

by the Kisfaludy Society for a poem on current events, and two years later won the prize for the best Magyar epic with the first part of his trilogy *Toldi*. He became secretary to the Hungarian Academy in 1865, and died Oct. 24, 1882. His later works include *The Siege of Murany*, the second and third parts of *Toldi*, *King Buda's Death*, an epic, and numerous

ballads. By making his poetry the expression of national hopes and popular feelings he greatly influenced Hungarian literature.

Aranyi, JELLY D' (b. 1895). British violinist. Born at Budapest, May 3, 1895, she came to England at the age of 14 and made her first public appearance there, later becoming a naturalised British subject. In Feb. 1938, she gave the first performance in England of Schumann's violin concerto, which she and her sister, Adila Fachiri (*q.v.*), were chiefly instrumental in rediscovering. She claimed to have received a message from Schumann at a spiritualist séance, telling her of the concerto's existence in MS. form in Berlin.

Arapuni. Hydro-electric generating station in Auckland prov., North Island, New Zealand. It was constructed to supply all the requirements of the Auckland district. Development work began in 1925 and operation in 1929. In 1943 there were operating six units with a total capacity of 126,000 kVA, and the scheme provides for eight units with a capacity of 174,000 kVA. The static head is 175 ft. The station is linked with Horahora, Mangahao, and Waikaremoana.

Ararat. A region in Turkey, in the vilayet of Kars, watered by the river Aras (Araxes). The name has been erroneously applied to the highest mt. in the district, on which the Ark is supposed to have rested, but the Bible (*Gen. 8*) speaks of the "mountains of Ararat." The double-peaked volcanic summit of Ararat is known to the Armenians as the *Massis*, to the Turks as the *Aghri Dag*, and to the Persians as the *Koh-i-Nuh*, or Mountain of Noah. An earthquake



Ararat. Highest point of the Armenian plateau called by the Persians the Mountain of Noah

in 1840 dislodged large masses of the mountain and destroyed the village of Arghuri. The first complete ascent was made by Dr. Perrot in 1829. See Ark of Noah.

Ararat. Town of Victoria, Australia. It stands near Hopkins river, 130 m. by rly. W.N.W. of Melbourne, surrounded by a region given over mainly to growing wheat and rearing sheep. Other industries are extensive vineyards, a trade in timber, the mining of gold, slate, etc., and the making of soap, leather, and bricks. Pop. 4,900.

Aras. River of Asia Minor, the ancient Araxes. It rises in the Erzerum vilayet, flows E. through S. Caucasia, forms the boundary between Azerbaijan S.S.R. and Persia, and enters the Caspian Sea, partly by a direct channel and partly by uniting with the Kur. It is 600 m. long, and its chief tributaries are Arpa Chai and Kara Su.

Aratus of Sicyon (271–213 B.C.). Greek general and statesman. From 245 he was many years general of the Achaean League (*q.v.*), which he strengthened by securing several new states as members. Unfortunately he alienated Sparta, and to secure a counterpoise sought alliance with the Macedonians, depriving the league of its distinctive character as the champion of Greek freedom.

Arauca. A town of Colombia. Standing on the Arauca, here bordering Venezuela, it is the capital of the commissary of Arauca (pop. 11,156). The Arauca river is 450 m. long.

Araucanians (Quichua, rebels). Group of S. American Indian tribes inhabiting S. Chile. The name indicates their independent character. Long-faced, roundish-headed,

convex-nosed, pale yellow, muscular, averaging 5 ft. 3½ ins. in height, they reproduce in temperate S. America the vigorous type of such northern Amerinds as the Iroquois, at the cultural level of the Navaho. Ethnically akin to the Andean stock, they resisted the Inca domination, although those bordering upon the Peruvian civilization did not escape its cultural influence. They were the only aboriginal people who never submitted to the Latin subjugation, their first invader, Valdivia, having been slain by them in 1553.

Calling themselves Mapuche, or war men, they recognized such groups as Picunche, or north men, Huilliche, or south men, Moluche, or west men, and—centrally—Pehuenche, or pine men, and an outlying group E. of the Cordilleras are the Puelche, or east men. Their number in Chile is about 100,000. They have never risen to nationhood; when necessity arose a military chief (*toqui*) was elected from each of the four tribal divisions. Their primitive hunting life, with low skin tents for dwellings, has been largely displaced by more settled vocations, including stockbreeding and farming. There are traces of an ancestral totemism, and their animism included a recognition of a thunder-god (*Pillan*). Deceased warriors were interred with their weapons, and their steeds were consumed at funeral feasts, a hereafter in the Milky Way being inculcated. *Caupolicán*, a warlike chief of the Araucanians, offered so fierce a resistance to the Spanish until his capture and cruel execution in 1558 that his name and exploits became legendary, and were made the theme

of a fine Spanish epic, *La Araucana*, by the poet Ercilla. The figure of *Caupolicán*, typifying his race, is a favorite and much copied sculpture in Chile. After an attempt by a French adventurer, Antoine de Tounens, to found an Araucanian kingdom in 1861, the Araucanians formally acknowledged Chilean rule in 1870. See American Indians.

Arauco. Coastal province of S. Chile. It comprises much of the former region of Araucania. Area 2,222 sq. m. It has a productive soil,



Arawak. Types of S. American Indians inhabiting British and Dutch Guiana

large forests, and coal deposits. Lebu is the capital. Pop. 66,107.

Aravali Hills. Mountain range of India. It extends in a N.E. direction from Gujarat through Rajputana. Its loftiest summit is Mount Abu (5,650 ft.). The hills are the worn-down stumps of an ancient mountain range.

Arawak. Tribe of S. American Indians, inhabiting parts of British and Dutch Guiana. These cassava-eaters are forest-dwellers, interposed between the coast Warraus and the inland Caribs. They are a weak-bodied, peace-loving people, who once extended from Bolivia to the W. Indies and Florida, where they were in process of displacement by the Caribs at the Spanish conquest. They use bows and arrows and blow-guns. Their dress is little more than an apron; ornament is furnished by feathers, seeds, and shells. Their primitive animism involves the resort to medicine against unfriendly spirits. See American Indians.

Arbaces. Median chieftain. The statement of Ctesias that he revolted against the Assyrian king Sardanapalus, destroyed Nineveh about 876 B.C., and founded the Median empire, is unhistorical. Cuneiform records of that age reveal a place-name *Arbaki*; later the personal name *Arbaku* appears. Nabopolassar of Babylon may have had a Scythian ally of this name at the siege of Nineveh in 606. Xenophon mentions a Median satrap *Arbaces* in the army of Artaxerxes Mnemon at Cunaxa in 401. *Arbaces* is the name of a character in Lytton's *Last Days of Pompeii*.

Arbalest (Latin *arcus*, bow; *ballista*, projectile machine). Ancient weapon, also known as a cross-bow, for discharging short arrows, stones, or bullets, which obtains its power from a spanned bow of spring steel. Suggested, probably,



Araucanians. Statue of the chief *Caupolicán*, typifying his race. Right: Photograph of Araucanian woman

from a knowledge of the ballista or mangonel, the arbalest seems to have come into use in the 11th century, but is not depicted on any monuments of the time. The Second Lateran Council in 1139 forbade its use in warfare by Christians as being too murderous. It is believed to have been introduced into England by William the Conqueror, but for some years was only used for hunting purposes. It began to assume a position of military importance during the Crusades. In England it was almost completely superseded by the long bow in the 14th century; in most other countries it was displaced by firearmstowards the end of the 15th. Its last appearance in European warfare was in 1807, against Napoleon in Poland, though the Chinese used it at Taku in 1860.

The majority of arbalests were used as hand weapons, but a few specimens of enormous proportions are known, which were permanently fixed on the walls of castles

powerful to kill a man or horse at 250 paces and had a maximum range of 400 paces.

Even after the introduction of firearms, the arbalest was preferred to the arquebus as being more efficient for military use, while the absence of noise, smoke, and flame was considered a great advantage in hunting even after firearms had been much improved, as it enabled several shots to be fired without the quarry being frightened or disturbed.

Arbe (Slav., *Rab*). An island of the Adriatic belonging to Yugoslavia. It is in the Gulf of Quarnero, an opening of the Adriatic Sea, and is about 12 m. long. The inhabitants are mainly fishermen and tillers of the ground. Arbe, the capital, is a picturesque walled town on the W. coast, with an old cathedral, a castle, and other buildings of interest. In the Middle Ages the island belonged to the republic of Venice.

Arbela. An ancient town of Assyria. The modern Arbil or Erbil, of Mesopotamia, and known to the Assyrians as Arbailu, the city of four gods, it lies 40 m. S.E. of Mosul. It gave its name to the battle in which Alexander the Great finally defeated Darius, 331 B.C. The actual scene of the battle is said to have been Gaugamela, about 25 m. N.W. Pop. 4,000.

Arber, EDWARD (1836-1912). English editor, chiefly of works previously almost inaccessible to the general public, as in his English Reprints series, 1868-71. He was born in London, Dec. 4, 1836, and died there Nov. 23, 1912. He was professor of English at Mason college, Birmingham, 1881-94.

Arbitrage. Term used in stock exchange circles for the relation between the value of a particular stock in one market and its value at the same time in another, say London and Paris. A dealer might be able to buy French Rentes in Paris somewhat cheaper than in London; he does so and sells them in London, and the transaction is called an arbitrage. It is also applied to the buying and selling in a similar fashion of bills of exchange, bullion, etc. The words arbitrage, arbiter, arbitration are derived from Lat. *ad*, to; and *bitere*, to go; thus an arbiter is properly one who goes to see, who is called in to settle a question. See Stock Exchange.

Arbitration. In English law, the decision of a matter in dispute, not by a court of law, but by a person called an arbitrator. The general law relating to arbitration

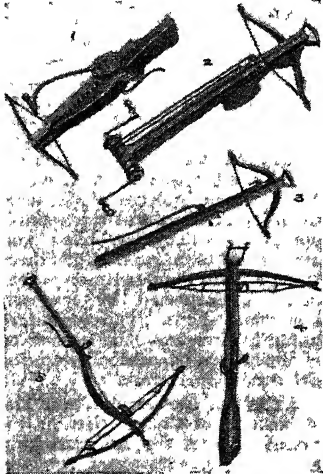
is contained in the Arbitration Act, 1889. Arbitration under this Act is voluntary. There may also be compulsory arbitration by order of the court.

(1) Voluntary arbitration is where two or more parties have made a *submission* in writing, agreeing to submit a specific dispute, or a class of disputes, or all disputes between them to arbitration. They may agree to have two arbitrators, one appointed by each party. If they do not so agree, a single arbitrator acts, and if the parties cannot agree on one, the court will appoint one. If there are two arbitrators, these two must appoint an umpire to decide, if they should differ. If the arbitrators cannot agree on an umpire, the court will appoint one. If the submission is to two arbitrators, and one party refuses or neglects to appoint his man, the other party should appoint his, and give notice, and if his opponent does not appoint within seven days, the one arbitrator may be appointed sole arbitrator. An arbitrator must not take sides. He is sitting as a judge, and should have no private communications with either party. He must not be interested in the result of the case. He must not make up his mind beforehand. If he does any of these things, or is guilty of any misconduct in the arbitration, he can be removed by the court, and a new arbitrator appointed.

(2) Compulsory arbitration is where the court refers to a special referee, or to one of the official referees, a case involving investigation of complicated accounts, or very numerous items, or scientific or technical matters. The most common of these cases are claims for dilapidations to house property, builders' accounts, claims on engineering contracts, and the like, in which a very large number of small items must be dealt with. An appeal lies from an official referee and from other arbitrators on questions of law.

Certain statutes, e.g. the Friendly Societies Act, provide for the settlement of disputes by arbitration, and arbitration is frequently employed in cases where the price of land required by rly. companies and other public bodies is in dispute.

Arbitration, INDUSTRIAL. Method by which disputes between employers and workmen are referred to an independent arbitrator for settlement. Where the submission is made by the actual parties to the dispute, the arbitration proceeds on the same lines as commercial arbitrations in general.



Arbalest. 1. Lever arbalest, a cross-bow fitted with a cranequin. 2. Arbalest with windlass and compound pulley-gear. 3. Simple arbalest. 4. Bullet arbalest. 5. Arbalest for stones (16th century)

or towns and discharged arrows 12 ft. long with sufficient violence to pierce the bodies of several men in succession. In all types, after spanning the bow, the string was placed on a catch, whence it was released by pressing the trigger after the missile had been put in position and aim taken, the latter being done as with a modern rifle, except that in earlier types the stock was rested on top of the shoulder instead of being pressed against it.

The ordinary type of arbalest used by hand was sufficiently

and is governed in Great Britain by the Arbitration Acts. Often, however, the dispute arises out of a trade union agreement, the parties to which are associations of employers and workers; in such cases, unless the associations are acting expressly as agents of named and identifiable groups for the purposes of the arbitration, the award is binding only on the associations as distinct from individuals. Another point of difference is that whereas the subject matter of an ordinary arbitration is usually an *existing* contract, industrial arbitrations are commonly concerned with the terms and conditions of *future* contracts of employment.

Industrial arbitration can be (a) compulsory, as operated during the First Great War under the Munitions Act in this country, and as has been the practice in New Zealand since 1894, and Australia since 1904; or (b) voluntary. Since the Whitley committee in 1917 pronounced against compulsory arbitration, the voluntary principle has been the accepted rule in industrial arbitration in the U.K.

As early as the reign of Elizabeth magistrates were entrusted with special powers for settling labour differences. The Employers and Workmen Act, 1875, still in operation, is another example of the use of the courts for the purpose. But industrial arbitration proper began with the Conciliation Act, 1896 (itself the result of a Royal Commission of 1891), whereby the Board of Trade was *inter alia* empowered to appoint an arbitrator to determine an industrial dispute on the application of the parties thereto. From 1908 onwards standing panels of independent persons have been maintained for the purpose of constituting courts of arbitration, and in 1916 the Board of Trade's functions in the matter were transferred to the newly formed ministry of Labour.

Modern Practice

The 1896 Act, although still on the Statute Book, has now for all practical purposes been superseded by the Industrial Courts Act, 1919 (the consequence of another recommendation of the Whitley committee). The industrial court was thereby set up as a permanent body for the settlement of trade disputes, the members being appointed by the minister of Labour from employers' and workers' representatives, independent persons, and one or more women. The president is appointed by the minister from among the independent members.

The president may call in the assistance of assessors. On a trade dispute being reported to him by either of the parties, the minister may, with the consent of both parties, refer the matter to the industrial court, or to an arbitrator or arbitrators appointed by him, or to a board of arbitrators comprising nominees of the parties concerned in equal numbers, and an independent chairman nominated by the minister. But where arrangements already exist in the trade for conciliation or arbitration the minister may take action only after those arrangements have failed to produce a settlement. There is no compulsion on the parties to accept the decisions of the industrial court, but there have been few cases of rejection, and the cumulative experience of the members of the court in the handling of these disputes has been a decisive factor in the growth of industrial arbitration.

National Arbitration Tribunal

The setting-up of the national arbitration tribunal to exercise functions which are to some extent parallel with those of the industrial court was one of the emergency measures of the Second Great War. By the Conditions of Employment and National Arbitration Order, 1940 (made under Defence Regulation 58 AA), and with the object of reducing industrial stoppages which would impede the war effort, the national arbitration tribunal was set up, consisting of five persons appointed by the minister, *viz.* three appointed members including the chairman, one representing employers, and one representing workers. Any trade dispute reported to the minister by either party may be referred by the minister to the tribunal where in his opinion no suitable means for settlement exist under a trade union agreement. It is illegal for an employer to declare or take part in a lock-out, or for a worker to take part in a strike, unless the dispute has been so reported to the minister and the minister has not, during 21 days following the report, referred the dispute for settlement. This provision follows the lines of the Canadian law, the Industrial Disputes and Investigation Act, 1907 (known as the Lemieux Act), and has been a powerful means of preventing industrial stoppages.

The trade union agreements covering the larger industries almost invariably contain arbitration clauses which often include a

provision for negotiating or for conciliation machinery as the first step towards the settlement of differences, and this practice is now generally adopted in the smaller industries as well. **H. Samuels**

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Arbitration, INTERNATIONAL. This subject is fully discussed under International Law.

Arblay, FRANCES D. Married name of the British novelist known as Fanny Burney (*q.v.*).

Arboga. Town of Sweden, in Vestmanland province. It stands on the Arboga, 25 m. by rly. N.E. of Orebro, and has communication with Lakes Mälär and Hjelmär by river and canal. The town was important in the Middle Ages, and diets were held here, notably those of 1561 and 1597, as were several church assemblies. The church has a Rembrandt altar-piece. Pop. 5,500.

Arbogast (d. A.D. 394). Frankish general. Under the emperors Gratian and Valentinian II he was in the Roman service and distinguished himself by victories over the Goths and by overthrowing the usurper Maximus. He is said to have contrived the murder of Valentinian in 392 and set up Eugenius, a puppet of his own, as emperor. Theodosius, the emperor of the East, then intervened; Italy was invaded, and Arbogast was defeated on the river Frigidus, near Aquileja, in 394, and soon afterwards put an end to his life.

Arboriculture (Lat. *arbor*, tree; *cultura*, cultivation). In its widest sense, the cultivation of trees. In modern practice the term is usually applied to the culture of trees for ornamental and decorative purposes, as distinct from planting in large quantities for the sake of timber values, which is technically known as forestry. The planting and maintenance of standard fruit trees, such as apple, plum, and pear, is also an important branch of arboriculture. Evelyn's *Sylva*, published in 1664, rendered great service to arboriculture, and many ornamental plantations in England are the outcome of it.

Arbor Low. Megalithic structure near Bakewell, Derbyshire. A circle of 30 stones, now overturned, enclosing a megalithic ruin, is surrounded by a fosse and rampart 250 ft. across. Its late

Neolithic age was proved by a British Association Committee in 1901-2. The term low (O.E., hill) is due to an adjacent Bronze Age round-barrow.

Arbor Vitae (Lat., tree of life) Popular name for cypress-like evergreen coniferous trees, of which

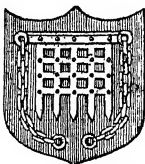


Arbor Vitae, or the tree of life

the principal species are the American (*Thuja occidentalis*) and the Chinese (*T. orientalis*). The leaves are reduced to minute scales which overlap one another and are closely pressed to the twigs and branches. Their under-

surface is coated with wax, which gives it a whitish appearance. Both species have a strong aromatic odour.

Arbroath OR ABERBROTHOCK. Royal, mun., and police burgh and seaport of Angus co., Scotland.



Arbroath arms

It stands on the Brothock, near its mouth, about 17 m. N.E. of Dundee by railway. The principal industries include ship-building, flax-spinning, engineering, sailcloth, and linen. It is the chief town of a rich agricultural county. There is an airfield, used jointly by the R.N. and R.A.F. in the Second Great War. The harbour is accessible to vessels of 1,000 tons. There are ruins of an old abbey. Arbroath, the Fairport of Scott's Antiquary, has a signal tower, 50 ft. high, in communication with the lighthouse on Bell or Inchcape Rock, 12 m. S.E. Market day, Thurs. Pop. 19,437.

Arbues, PETER (1441-85). Spanish inquisitor. He was born at Epila, in Aragon, studied at Bologna, and then became a canon regular at Saragossa. In 1484 he was appointed chief inquisitor of Aragon, and his severity to the Marranos, Jews who after receiving baptism returned to Judaism, provoked retaliation. He was stabbed by hired assassins in the cathedral of Saragossa, and died of his wounds two days later, Sept. 17, 1485. Regarded as a martyr in Spain, he was canonised by Pope Pius IX in 1867.

Arbuthnot, JOHN (1667-1735) British physician and author

Born at Arbuthnott, Kincardineshire, he came to London in 1691, studied at University College, Oxford, and graduated in medicine at St. Andrews in 1696. He became court physician to Queen Anne, 1705, and soon built up



John Arbuthnot, British author

a large and fashionable practice. Among his friends were Pope, Swift, Congreve, Gay, and Prior, and he was closely associated with Swift in writing for the *Torres*. He was the author of the well-known political satire, *The History of John Bull*, 1712, and *The Memoirs of Martinus Scriblerus*, published among Pope's works, 1741. See *Life and Works*. G. A. Aitken, 1892.

Arbuthnot, SIR ROBERT KEITH, BART (1864-1916). British sailor Born March 23. 1864, he entered the navy in 1877. In 1889 he succeeded his father as 4th baronet in a Scottish title dating from 1823, and in 1912 he attained the rank of rear-admiral. In 1913 he commanded part of the 2nd Battle Squadron, and after the outbreak of the First Great War

took over the 1st Cruiser Squadron. He led this to the battle of Jutland, flying his flag in the *Defence*. About 6.15 p.m. on May 31, 1916, his ship was sunk while fighting some German light cruisers, and Sir Robert and all his crew were lost. He wrote books on naval matters. See *Jutland*, *Battle of*.



Sir Robert Arbuthnot, British sailor

Arbutus (Lat., wild strawberry). Genus of evergreen trees and shrubs of the natural order Ericaceae. Natives of the N. temperate regions,



Arbutus unedo, or the strawberry-tree

they have alternate leaves, and bell-shaped or globular white or red dish flowers in clustered sprays. *A. unedo* is the strawberry-tree of S. Europe and W. Ireland, so called on account of its

large orange-red edible fruits. See *Strawberry-tree*.

Arc (Lat. *arcus*, bow). In mathematics, part of any algebraic curve, most commonly of the circle.

An electric arc is an arc formed when two conductors or electrodes are brought into contact and then separated to within a certain distance while current is flowing. The arc (so called from its shape) consists of incandescent and conductive vapour arising from the volatilisation of the substances forming the electrodes. An arc will continue until, by wastage, the increase of space between the electrodes introduces a resistance beyond the conducting power of the vapour stream. With continuous current a cavity or crater is formed in the positive electrode, but the negative does not waste; with alternating current both electrodes tend to be equally affected. Practical applications of the arc are lighting, heating, and the cutting or welding of metals. In welding (*q.v.*), the metal usually forms one electrode, and a carbon or metallic rod the other, the arc being maintained between. See *Arc Lamp*; *Electric Furnace*.

Arcachon. Town of France, in the department of Gironde. Standing on the Bassin d'Arcachon, a shallow opening of the Bay of Biscay. 34 m. by rly. S.W. of Bordeaux, it is a pleasure resort in summer, and its climate and pine woods, which clothe the dunes encircling the town, make it popular for invalids in winter. Its broad smooth sands afford excellent bathing facilities. Arcachon is a fishing centre and has extensive oyster beds. Pop. 10,266.

Arcade (Lat. *arcus*, bow, arch). Range of arches standing on piers or columns, either free-standing or attached as decoration to the surface of a wall. In the latter sense the arcade was a feature, though a rare one, of Greek architecture. On the S. side of the Acropolis at Athens there is a wall composed in part of piers and arches, which dates from the time of Eumenes II, king of Pergamum 197-159 B.C. The arcade, however, like the arch, assumed no real importance until Roman times. By the Romans it was transmitted to the medieval Italians, and the Italian cities are still rich in this feature. In Venice, Bologna, Naples, Turin, and other towns there are many streets of houses the fronts of which rest on highly picturesque arcades. The long porticoes surrounding the Vatican and other Roman palaces are arcades, or, when the arches are carried by columns, arcaded colonnades.



Arcades. 1. Front of the Ducal Palace at Venice, showing its beautiful double arcade, that on the ground, and that of the gallery above it. 2. Arcaded front of the church of S. Francesco di Paola, at Naples, the pillars of which are like those of a classic colonnade. 3. Arcade, to the right, of the Piazza S. Carlo at Turin. 4. Palazzo Fava at Bologna

Arcades are usually built round public courts or squares, market places, and in other situations where they can serve a distinct utilitarian purpose. It is in ecclesiastical architecture principally that they have been transformed into objects of beauty. The nave arcades of many Romanesque and Gothic cathedrals are frequently their chief architectural feature. The cushion capital, which enabled the Byzantine builders to spring their arches directly from the piers or columns, was afterwards adopted eagerly by the Romanesque and Gothic architects, and arcades of this character are the most graceful. Medieval church architecture abounds in instances of the arcade as an ornamental dressing to the wall, taking the form of moulded arches supported by colonnettes. A more modern application of the term is to glass-roofed streets of shops, e.g. the Burlington Arcade, London, or those in many seaside resorts.

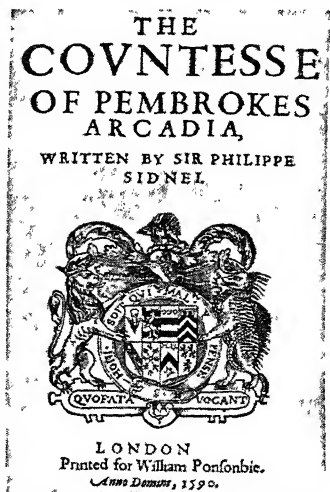
Arcadia. Country of ancient Greece. It occupied the centre of Peloponnesus, and was completely cut off from the sea by Achæa on the N., Argolis on the E., Messenia and Laconia on the S., and Elis on the W. A very mountainous country, its physical characteristics enabled the inhabitants continuously to preserve a semblance of independence. It was extremely well watered. The Stympalian lake (mod. Zaraka) was the fabled home of the terrible Stympalian birds whose destruction by Her-

cules was one of the hero's Twelve Labours. Its waters were conveyed to Corinth by an aqueduct constructed by Hadrian. The chief towns were Mantinea, Tegea, and Orchomenus. According to ancient tradition the inhabitants were racially the oldest in Greece. They were devoted to pastoral pursuits and fond of music; hence the poetic identification of Arcadia with romantic simplicity. Originally governed by kings, Arcadia was later divided into independent republics such as Mantinea and Tegea. After the battle of Leuctra in 371 B.C., Epaminondas formed an Arcadian League with a new city, Megalopolis, as its capital, but the league was of short duration. The modern Arcadia forms a division of Greece, and has an area of 2,020 sq. m. Pop. 187,327. *See* Greece: History.

Arcadia. Name of several pastoral romances, written partly in prose and partly in verse. All owed something directly or indirectly to the Greek romances of Heliodorus (3rd century A.D.) and Achilles Tatius (3rd century A.D.). The Arcadia of the Italian poet Jacopo Sannazaro appeared in 1590; that of Robert Greene, 1599, was first published as Menaphon, or Camilla's Alarum to Slumbering Euphues, in 1589; and the most notable of all, that by Sir Philip Sidney, appeared originally in 1590.

Sidney's work, one of the foundation books of English literature, was written for his sister, and called *The Countess of Pembroke's*

Arcadia. Its composition was influenced by Sannazaro's *Arcadia* and the *Diana* of the Portuguese Spaniard Jorge de Montemayor. In turn its influence was reflected in Shakespeare's *King Lear* and *The Two Gentlemen of Verona*; Beaumont and Fletcher's *Cupid's Revenge*; John Day's *Ile of Guls*; James Shirley's pastoral, *Arcadia*; Francis Quarles's *Argalus and Parthenia*; and the writings of Samuel Richardson, Sir Walter Scott, and others. It is recorded that Charles I read *The Arcadia* while in prison.



Arcadia. Title-page of the first quarto edition of the Countess of Pembroke's *Arcadia*, by Sir Philip Sidney

A first draft, in five books, was circulated in MS. The first printed edition, 1590, perhaps edited by Fulke Greville, ends where the author left his revision, in ch. 29 of Book III. In 1593 another edition was issued with preface by Henry Sandford, the earl of Pembroke's secretary. Twelve editions came out between 1593 and 1674, with additions by Sir W. Alexander (1621), R. Beling (1624), and others. Translated into French 1625, and German 1629, it was modernised by Mrs. Manley, 1725.

As first written *The Arcadia*, which is interspersed with poems, some of great beauty, formed, says Bertram Dobell, a complete and coherent story with a well conceived plot, which the revision lacks. Sidney is usually identified with the character of Philisides, Penelope Devereux with Philoclea.

Arcadia, GULF of. Opening on the W. coast of the Morea, Greece. It lies between Cape Katakolo and Cape Konello, 35 m. apart.

Arcadians, THE. A "fantastic musical play" by Mark Ambient and A. M. Thompson, with music by Lionel Monckton and Howard Talbot. Produced at the Shaftesbury Theatre, London, April 28, 1909, it had an unbroken run for more than two years. The musical score was notable for such well known songs as *The Pipes of Pan* and the lugubriously amusing *I've Got a Motto*.

Arcadius (c. A.D. 377-408). First East Roman emperor. Elder son of Theodosius the Great, on the division of the empire at his father's death in 395 he received the eastern part and his brother Honorius the western. Arcadius

played a subordinate part, the real rulers being the prefect Rufinus, who was murdered in 395, the eunuch Eutropius, executed in 399, and Eudoxia, the emperor's consort, who died in 404. The Goth Garmas held the chief power 400-2, and on his death Aurelian, the pretorian prefect. The banishment in 404 of the patriarch S. John Chrysostom for his outspoken sermons against the vices of the imperial court established the supremacy of the emperor.

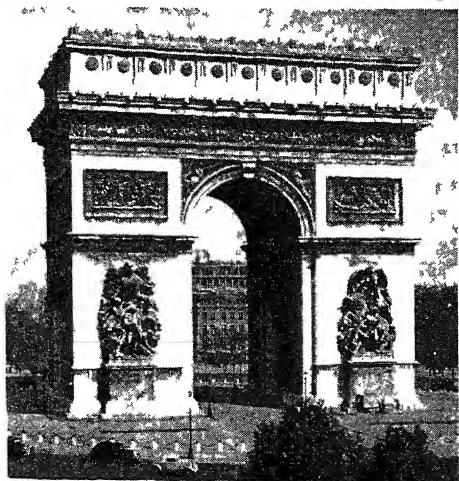
Arcanum (*arcere*, to shut up). Latin word meaning a secret or mystery. It is generally used in the plural, *arcana*, which in the 17th and 18th centuries was often treated as a singular, with plural *arcana*. The term was applied by the alchemists to the secrets of nature, and especially to wonder-working remedies and preparations. The great *arcanum* was the secret of transmuting base metals into gold. See *Alchemy*.

Arc de Triomphe. Name of two arches in Paris commemorating the Napoleonic triumphs of 1805-6. The *Arc de Triomphe de l'Étoile* (triumphal arch of the star) was begun by Napoleon from designs by Chalgrin, and completed by Louis Philippe. Standing in the centre of the high *Place de l'Étoile*, at the W. end of the *Champs Élysées* Avenue, this structure is 162 ft. high, 147 ft. wide, and 73 ft. deep, and has a number of fine sculptures on its façades. There is a spacious view of Paris from the top of the arch, to which the public is admitted. After the French defeat in the Franco-Prussian war of 1871 the archway gates were closed until

Marshal Foch led his armies through in the victory march of 1919. Later the body of an unknown French soldier of the First Great War was buried under the arch and a flame kept perpetually burning at the head of the tomb stone. The *Arc de Triomphe du Carrousel* (triumphal arch of the tilting yard) is at the E. end of the *Tuileries* Gardens, and, though much smaller (48 ft. high and 63½ ft. wide), is more beautiful.

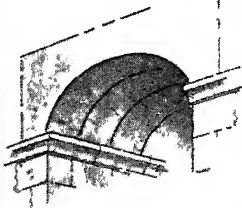
Arcesilaus (315-241 B.C.) Greek philosopher and founder of a philosophical school known as the *Middle Academy*. This school taught that absolute knowledge about anything was impossible, and that probability was the nearest it was possible to attain. See *Academy*, *Philosophy*.

Arch. Term used in architecture to denote a structural member spanning vertically an opening or recess. Mechanically, it is an assemblage of pieces arranged over the opening in such a way that the vertical pressure of the load carried becomes two lateral pressures on the abutments. An arch is composed of a crown with two supporting flanks, known as haunches or reins, the width between which is called the span. It is divisible into two main species, round and pointed, as exemplified by the Roman and the Gothic, but there are many varieties of each. The chief forms of round arch are the semi-circular, horseshoe, segmental, and elliptical. Pointed arches include the lancet, four-centred Tudor, the fantastic ogee arch, the trefoil, cinquefoil, and polyfoil arches, and the "rampant" arch, of which the impost on one side is higher than that on the other. The material

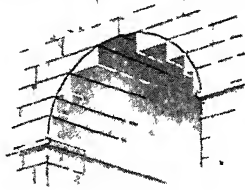


Arc de Triomphe and (right) Arc de Triomphe du Carrousel, Paris. These arches were erected to commemorate Napoleon's triumphs in 1805-6. The former, also commemorating the successes of the Revolutionary army, is noted for its sculptures.

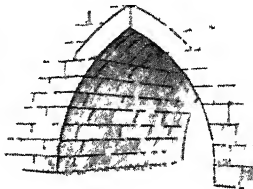
Vaulted ceiling formed of deep blocks of stone placed side by side on edge From the Temple of Sebasteia Egypt



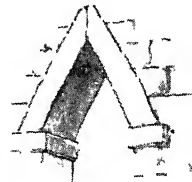
Vaults constructed with long blocks of stone laid horizontally projecting over each other The lower angles of the courses (shown in white) were then cut away From Thebes



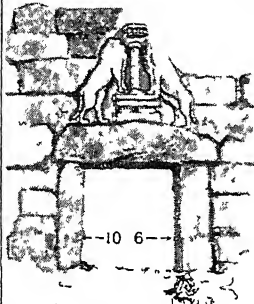
Etruscan pointed arch from the aqueduct at Tusculum



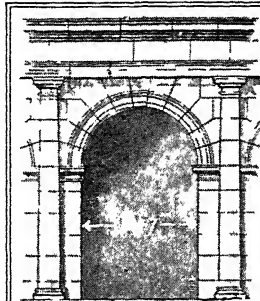
Angular arch of the Saxon period (England)



FIVE TYPES OF EARLY ARCHES



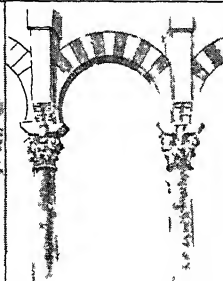
The Lion's Gate, Mycenae illustrating the lintel or flat arch



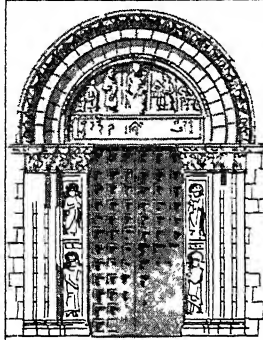
ROMAN
The Colosseum Rome



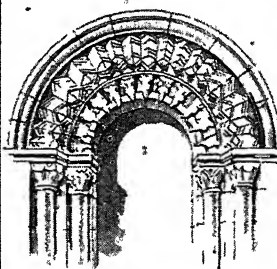
BYZANTINE
St. Sophia's Constantinople



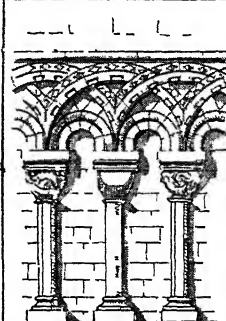
MOORISH
Mosque of Cordova



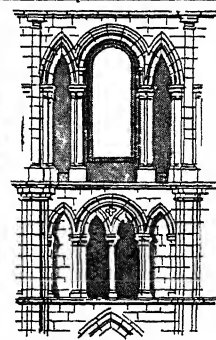
ROMANESQUE
St. Clemente Church Rome



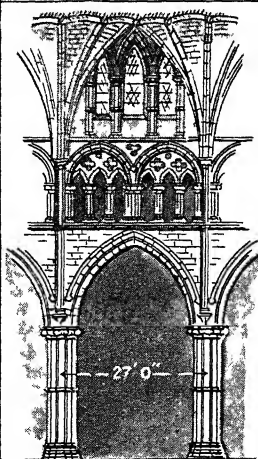
NORMAN
St. Ebbe's Church Oxford



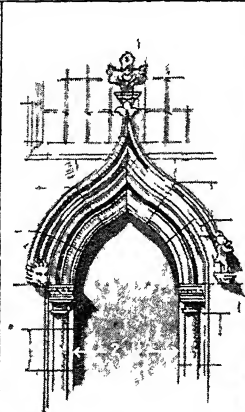
NORMAN
Canterbury Cathedral interlacing arches suggesting pointed arch



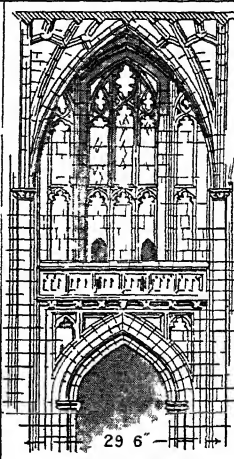
TRANSITIONAL
Ripon Cathedral



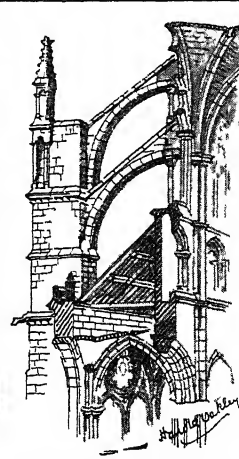
EARLY ENGLISH
Lincoln Cathedral Nave



DECORATED
St. Mary's Church Beverley



PERPENDICULAR
Winchester Cathedral



FLYING BUTTRESSES
Amiens Cathedral

ARCHES IN THE ARCHITECTURE OF MANY AGES AND PEOPLES

of which an arch is composed are called *voussours*: the inner side of the arch is known as the intrados, and the outer side as the extrados. The keystone is the brick or block of other material occupying the centre of the crown, and the springer, or springing stone, is that placed immediately over the impost.

Historically, the arch is identified with Roman building, though the Romans were not the originators. Just as the Greeks took the lintel and post construction from the Egyptians, and developed it in their own manner, so the Romans adopted the arch from the earlier Etruscan architecture. The arch was not unknown either to the Egyptians or to the Greeks after the time of Alexander: the elliptical arch form and even the pointed arch were used by the former, though only for strictly utilitarian purposes. In the same way the Chaldeans and Assyrians employed the arch for bridging the Mesopotamian rivers. In Roman hands, however, its use marks a definite break with the Greek building tradition of horizontal and vertical lines. The Romans confined themselves almost exclusively to the semi-circular arch. The Colosseum at Rome and the public baths erected by successive emperors show the use of the arch in combination with the column and lintel, by means of which Roman architecture still preserved its connexion with the Greek. But whereas in Greek work the columns are real supports, carrying the entablature, in Roman they are mainly decorative attachments to the face of piers carrying the arches.

TRIUMPHAL ARCHES A peculiarly Roman product was the triumphal arch. These arches were generally erected to commemorate a victory, but occasionally with other objects, e.g. as entrances to towns or great market places. Some consisted of a single arch, such as the Arch of Titus; others of three arches, a large central opening for chariots and two flanking ones for foot passengers. The Arch of Septimius Severus is generally considered the best of the latter kind, but much of the detail of the Arch of Constantine is excellent. At one time there were thirty-eight of these triumphal arches in Rome alone. There are also arches at Beneventum and Ancona, both in honour of Trajan, while outside of Italy the Arch of Marcus Aurelius at Orange, France, is one of the best known. Roman triumphal arches, however, were scattered far and wide through Europe and North Africa. The triumphal arches erected by Napoleon, and the Marble Arch leading

into Hyde Park, London, are all based on Roman models.

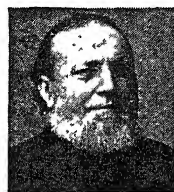
BYZANTINE AND NORMAN ARCHES. In Byzantine architecture the round arch was further developed in conjunction with the column. The Roman builders had used column and capital as embellishments to the arch rather than as structural necessities. The Byzantines, by inventing the cushion capital, enabled the column to be used as the direct support of the arch. Further, they extended the arch principle in the direction of the vault and the dome. The Mosque of S. Sophia at Constantinople, the last word in Byzantine building, illustrates the strength and beauty achieved by the application of this principle. The round arch was kept alive by the Romanesque builders and when the Gothic pointed manner had spent its force, was revived by the Renaissance architects. Meanwhile the Norman style, a derivative of Romanesque, had received its great impetus in Britain. Norman arches are nearly always semi-circular and plainly moulded, the exceptions being the entrance arches to great churches such as Ely Cathedral, which are profusely ornamented. Different varieties of the round arch are found in Moorish architecture. Here the horseshoe form is a favourite one. The Alhambra and other Moorish remains in Spain provide countless examples. The horseshoe arch frequently occurs in Buddhist architecture, where it is better known as the lotus-leaf arch.

THE POINTED ARCH. Though not unknown in the early Egyptian and Etruscan civilizations, this obtained no considerable footing in western Europe until the 10th century. It had a religious significance long before it was adopted as a useful architectural contrivance. To the Christian it expressed the aspiration of the human soul to heaven; to the Brahman it symbolised the clasping of hands in prayer. Hence it figures very conspicuously in the religion-inspired architecture of both East and West. In Europe, the history of the pointed arch is contained in that of the Gothic cathedrals. The lancet form of pointed arch has given its name to the first period of English Gothic, that of the 13th century. The lancet is the keynote of the design of Southwark Cathedral; and in the succeeding Decorated and Perpendicular periods the pointed arch determined absolutely the structure and the form of the building. The secular architecture of the Tudor period gave less scope for its employment, but it persisted in the Tudor arch, the four-centred

arch which is found in the old gatehouse to Lincoln's Inn, and in certain other London and provincial buildings. To-day the popularity of the Renaissance style demands the employment of the round arch except in church building, where a section of opinion still favours the Gothic. See *Architecture*; *Building*.

Bibliography. *Encyclopedia of Architecture*, J. Gwilt, ed. W. Papworth, 1867; *History of Architectural Development*, F. M. Simpson, 1905-11; *Byzantine and Romanesque Architecture*, T. G. Jackson, 1913; *A Handbook of Greek and Roman Architecture*, D. S. Robertson, 1929.

Arch, JOSEPH (1826-1919). British labour leader. He was born Nov. 10. 1826. at Barford, War-



Joseph Arch,
British labour leader
Elliot & Fry

wickshire, the son of an agricultural labourer, and trained himself by reading and as a local preacher among the Methodists to become the organizer and leader of his fellow labourers in their struggle for better social conditions. Not until 1872 was he able to establish the National Union of Agricultural Labourers. Arch's influence endured in the eastern counties, and he was elected Liberal-Labour M.P. for N.W. Norfolk, 1885, 1892, and 1895. In 1900 he retired from public life to a cottage at Barford, where he died in his 93rd year. Feb. 12, 1919. See his *Autobiography*, 1898.

Archæan (Greek *archaios*, ancient). Name applied to ancient pre-fossiliferous rocks. They occur beneath those of the Cambrian system, and are therefore synonymous with Pre-Cambrian. Usually the term is restricted to a series of gneisses, schists, and intrusive rocks that form the oldest recognizable portion of the earth's crust and upon which the first sediments of Pre-Cambrian age were deposited. See *Pre-Cambrian*.

Archæological Association, BRITISH. Society for the study of archaeology. Founded in 1843 for promoting the study and preservation of antiquities, it holds itinerant annual congresses in May. The offices are at 11, Chandos Street, London, W.1. It controlled the first issues of *The Archaeological Journal*, afterwards taken over by *The Royal Archaeological Institute of Great Britain and Ireland*, which has offices at 37, Onslow Gardens Kensington, S.W.7.

ARCHAEOLOGY: STUDY OF THE PAST

John Garstang, D.Sc., Professor of Archaeology, Liverpool University

This outline deals with the growth of archaeological methods and the aims of the trained investigator. The actual achievements are described under such headings as Aegean Civilization; Assyria; Babylonia; Crete; Egypt; Palestine; Ur; Verulamium

Archaeology, strictly the science of ancient remains (Gr. *archaios*, ancient; *logos*, science), must now be defined, in view of its modern development, as the study of human handiwork of the past. Originally a science of restricted scope, archaeology has maintained a close contact with the progress of cognate sciences, ethnology, geology, etc., and acquired an inseparable relationship with the fine arts. It is now the recognized intermediary between anthropology and ancient history, interchanging with each both methods and results, and in its broader aspect overlapping, to a certain limited extent and with a special purpose, the provinces of both.

Modern Progressive Changes

Anthropology is primarily concerned with man in his primitive state, and therefore with man's works as an example of human tendencies. Archaeology makes a specialised study of man's works of the past: while ancient history, within the more limited field illuminated by the light of written records, investigates man's deeds, of which man's works are the material witness. By this contact, archaeology has greatly benefited from the modern development of anthropological and historical research, the two most progressive changes being a widening and humanising of outlook and precision of method.

DEVELOPMENT. The development of the science of systematic archaeology out of the old-world antiquarianism is comparatively modern. Previously restrained by misconceptions of the Flood, and later circumscribed by the pan-Roman theorists who referred all examples of primitive culture to a classical origin, the subject owed the first stage of its radical emancipation to the antiquaries of the north. In Sweden and Denmark there was an exceptional wealth of unmixed archaeological remains, which could not readily be explained by the methods current in the classical areas. Application of the processes of induction and new methods of comparison resulted in the fundamental demonstration of a general uniformity in the evolution of primitive culture, of a natural sequence in the use of stone, bronze, and iron in the normal development of human experience and skill.

Archaeologists now held a master key which was applied in turn to the locked secrets of other lands with almost unvarying results, exceptions being noticed only where special metals or materials were indigenous or relatively easy of access. The principle of the evolution of primitive culture thus established, the science of primitive archaeology emerged, claiming for itself a hearing on all that concerned the material remains of the past from the diluvial period to the dawn of history. But while the principle became admitted the survival of primitive types until recent times in various sequestered spots on the globe indicated that the evolution of human culture was not generally contemporaneous. The principles of geology were no longer applicable to the details of the problem. It became obvious, rather, that in the process of civilization man was essentially sensitive to the circumstances of life and his environment. So the new science was saved from the fundamental error of too general application of its first principles. Historical methods became essential to further progress.

Archaeology and Humanity

Meanwhile, the archaeologists had recognized their now familiar tools and implements of stone and bronze in the hands of living man, and learnt to explain the usage of objects of primitive character in the past from the uses of primitive objects in the present. The human factor had been introduced into the formerly materialistic study. Thenceforward, in the treatment of ancient objects, it could never be forgotten that they were the product of man's hands, made by him to serve some purpose. To separate archaeology from its relation to humanity would be not only to deprive early history of its fundamental material, but would be prejudicial to a proper interpretation of early remains.

In such ways as these, proportionately to the general advance of knowledge, the methods of archaeology gradually developed. So, too, did the horizon of the archaeologist widen as a result of investigations in the morning lands, the homes of the great, old civilizations of the Nearer East. The discoveries of Layard in Mesopotamia, of Newton in the Levant, of Mariette in Egypt,

of Schliemann in Western Asia Minor, and of other pioneer explorers in these fields produced a profound impression. Hitherto the Assyrians, Babylonians, Egyptians, had been names of peoples, familiar indeed from childhood in the legends of the past, but visible only dimly in the distance through the mists of time; while Homer's story of Troy held almost the place of a national epic among the educated societies of Europe.

New Criteria for Historians

Now one by one these legends seemed to materialise, the people to become real, their works to become tangible. The mists were dispersed, and the old world came into view. Temples and images of gods, palaces and portraits of known kings, pictures of national events, the hearths and domestic objects of daily life, provided just the material wanting to complete the pictures of antiquity for which historical narrative had already prepared the outlines. The historian, further, received new and reliable criteria upon which to test the accuracy of ancient legends and to focus their relative importance. Archaeology became the accepted handmaid of ancient history. The barrier was finally broken down, enabling the two subjects to reap the advantages of collaboration, while at the same time opening the door for the mature development of the science of archaeology as it stands to-day.

We have briefly traced the development of antiquarianism into systematic archaeology and the establishment by common need of a science of primitive archaeology. We have realized the more recent improvement of method and the expansion of the field of archaeological inquiry, necessitating in effect the division of the growing subject into geographical branches. In this latest phase we shall find how the gradual overlapping with the domain of history has led to a reconstruction of the science, so that archaeology is now recognized as a collateral, co-related, albeit independent subject, treating of man's works, not only in prehistoric but in historic times, hence dealing, not only with primitive remains, but with all the culture products illustrative of civilizations.

RELATION TO HISTORY. This overlap with the domain of history has been foreshadowed already in the survival, here and there, of primitive types until modern times. It is definitely indicated by the fact that the transition from the Bronze to the Iron Age in the Greek world took place in the light of its contemporary history. The Iron Age

in this case becomes an historic phase, nor can its culture be classed as primitive. In the north, as we have seen, the three phases had glided one into the other in prehistoric times, that is to say, before the days of local or contemporary records; and as regards Western Europe generally, the Iron Age had already appeared before the expansion of the Roman empire interrupted the normal sequence of development, and at the same time, as it were, artificially opened the historic age.

But the growing acquaintance with the Nearer East disclosed the dawn of history there to be, relatively and actually, much earlier. In Egypt, for example, where nature granted its primitive population unusual protection from violent intrusion, writing is found in its primitive forms in the closing Stone Age of the earliest dynasties; while written narrative, the veritable boundary of history, appears with the fuller development of the Bronze Age in the time of the pyramid-builders 3000 years B.C.

Limits of Primitive Archaeology

Reciprocally, the progress of historical method has given rise to a parallel demand among historians for a systematic examination of original authorities, and hence to a recognition of the fact that the formerly dumb witnesses of man's handiwork may be made to yield, with proper handling, evidence at once reliable and of human interest in the story of men's deeds. The whole, in this aspect, involves the part, for man's works are a feature and illustration of his deeds.

From such considerations it becomes self-evident that there can be no real frontier between archaeology and history. The two are to be regarded as collateral and conterminous. Only the aims and to some extent the methods of these two branches of study are different. But the historian today, in reconstructing the fabric of society, cannot neglect to examine the foundations thereof; nor can he adequately describe man's deeds without the illustrations which man's contemporary handiwork alone affords.

MODERN SCOPE. To sum up, past generations have witnessed a noteworthy development in the study of archaeology, manifested in three several directions. First, expansion of field, leading to the division of the whole science into branches corresponding with known civilizations or culture areas—Assyrian, Egyptian, Hittite, Greek, Roman, Gallo-Roman, Celtic, etc. Secondly

extension of scope, admitting the consideration of the culture-products of historic times and so involving a further subdivision by sections corresponding to the subjects concerned, e.g. architecture, art, coins, cults, etc. Thirdly, improved methods and ever increasing results in practical investigation, fostering the tendency to specialisation, the natural outcome of this development.

Achievements in the Near East

The steady expansion of field is well seen in the researches of British archaeologists following up the threads left by earlier explorers. For example, the explorations of the interior of Asia Minor by Sir William Ramsay; the recovery of the Hittite Empire from its scattered remnants by Prof. A. H. Sayce; the systematic excavations in Egypt and Palestine by Sir Flinders Petrie and his followers, and particularly the establishment by the former of a series of sequence dating for prehistoric remains; Sir Arthur Evans's discovery of the Minoan civilization of Crete contemporary with the earlier civilizations of the Near East; Dr. D. G. Hogarth, who for over thirty years explored and illuminated by his writings Asia Minor and Arabia; Sir Leonard Woolley, whose work at Al Ubaid and Ur has revealed much early Mesopotamian history and prehistory, while his excavations at Alalakh in Syria, interpreted by Sidney Smith, have helped to rectify Mesopotamian chronology.

Others who have toiled in the Near Eastern field are: Dr. Henri Frankfort, who has made invaluable studies on Near Eastern pottery and cylinder seals; Miss (later Professor) Dorothy Garrod, who found in Palestine a link between Neanderthal man and *homo sapiens* in the caves at Mt. Carmel; while in Greece Professor Wace's work in Thessaly and Mycenae, as well as that of Professor Myers in Cyprus and the Aegean, Mr. Hentley in Macedonia, and A. Pendlebury in Crete and Egypt, must not be forgotten.

The link between British Near Eastern and Western European archaeologists is best exemplified by Professor Gordon Childe, whose synthesising studies embrace the whole field of European, British, and Near Eastern pre-history.

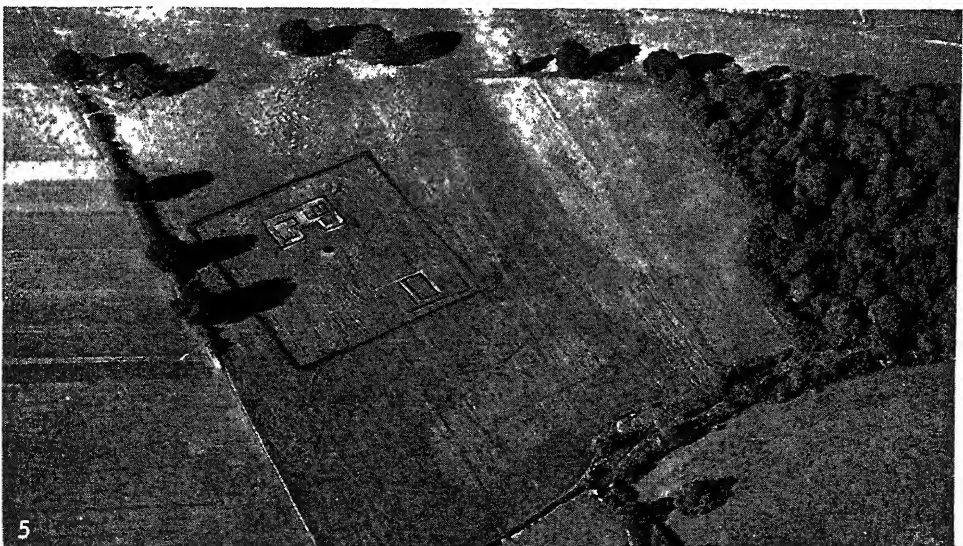
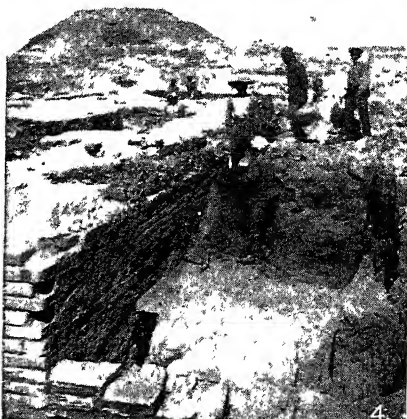
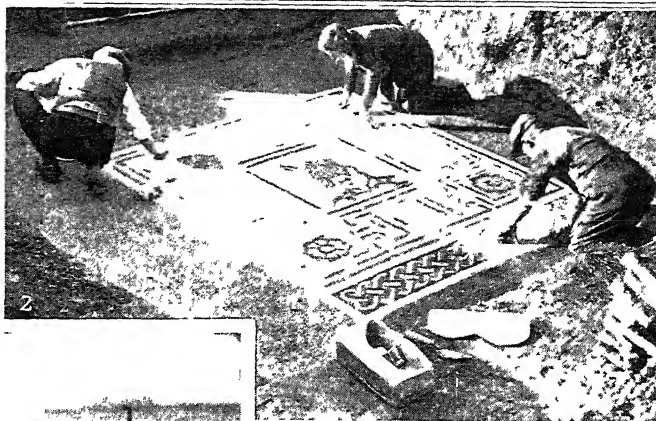
BRITISH ARCHAEOLOGY. British antiquaries early recognized the significance of the results obtained by the methods of systematic analysis and comparison in Sweden and Denmark; and, with the

Roman period as a convenient and determining landmark, the remains of Great Britain were more critically examined. The catalogues of British stone and bronze implements, by Sir John Evans, gave permanent expression to the value of comparative treatment; while Prof. Boyd Dawkins's Cave Hunting, General Pitt-Rivers's Excavations in Cranborne Chase, and other works revealed the advent of scientific method in practical investigation. The county surveys undertaken by the Society of Antiquaries provided a basis of scientific classification of prehistoric remains.

Prehistoric Britain

In the prehistoric field much has been done on the Palaeolithic, Mesolithic, and Neolithic periods. To mention only a few names, Dorothy Garrod's publication on the Upper Palaeolithic of Great Britain; Dr. Graham Clark's studies of the Mesolithic of Britain and western Europe, and Stuart Piggott's chronology of British Neolithic pottery. The work of Dr. Bullied and H. St. George Gray in the lake villages of Somerset revealed one facet of the Iron Age; while in the exploration of the hill forts of southern England much was done by C. F. C. Hawkes, Sir Cyril Fox, and Dr. R. E. M. Wheeler to prove links with the Continent. The present knowledge of Roman Britain is due largely to Francis John Haverfield, as shown by his book on the Romanisation of Roman Britain first published 1906. Haverfield's work was complemented by Dr. R. G. Collingwood's systematic accounts of every class of Roman antiquities in this country. In addition there have also been studies related to particular aspects, such as Drs. Oswald and Pryce's monumental work on *Terra Sigillata*.

Other contributors to the illumination of Roman Britain include J. P. Bushe-Fox's excavations at Richborough; Ian Richmond's Roman camps at Cawthorn; Dr. R. E. M. Wheeler at Caerleon, Lydney, and Verulamium, C. F. C. Hawkes at Colchester, and Miss Kenyon at Wroxeter and Leicester. There has been a marked improvement not only in the technique of excavation but in the use of new methods, such as geochronology and the use of soil and pollen analysis. The greatest development since the First Great War has been the use of air photography both for discovering new sites and for revealing new aspects of



1. Excavated wine shop at Pompeii; tapering bottles were inserted in circular holes in the ground or in masonry. 2. Roman mosaic floor uncovered at Verulamium, Herts. 3. Experts examining soil from the great earthworks at Maiden Castle, Dorset. 4. At

work on the debris covering the Temple of the Moon at Ur. 5. Site of a Roman villa at Ditchley, Oxon, the outlines of which were first revealed by differences, seen only from the air, in the corn crop covering the whole area. The outlines are emphasised here

ARCHAEOLOGY: HOW THE HIDDEN PAST HAS BEEN BROUGHT TO LIGHT

Photos, 2, John Gibson; 4, H. R. Hall 5 Ashmolean Museum, Dept. of Antiquities

old ones; with this work the name of O. G. S. Crawford is inevitably linked. His best known publications are *Air Survey and Archaeology*, and *Wessex from the Air*, but he also initiated a fine series of ordnance maps, e.g. that of Roman Britain, as well as editing the periodical *Archaeology*.

ACADEMIC REACTION. The widening field, the spreading branches, and the consequent tendencies of modern scholarship are well, though tardily, reflected in the development of archaeology as an academic subject in the universities and learned institutions. The first professorship in archaeology was instituted at Cambridge about the middle of the 19th century; it has established a firm tradition as a training school for archaeologists. There are now two chairs at Cambridge, the Disney chair in prehistoric archaeology, and the Lawrence professorship of classical archaeology. In the university of London the Yates professorship of archaeology, founded in 1880, was supplemented by the Edwards chair of Egyptology in 1892. A professorship in Western European archaeology has now been added. In addition the Courtauld Institute was established with a chair of Chinese art and archaeology; while the Institute of Archaeology, founded 1936, has a chair in Near Eastern archaeology.

Oxford's Lead

Oxford has gone farther than all other universities in recognizing the widening interests and special features of this subject. The first chair of classical archaeology and art there was not founded until 1884, but it has been supplemented by professorships or high posts in the special fields of Assyriology, Egyptology, Epigraphy, and Papyrology. The study facilities at Oxford have been much increased by the foundation of the Griffiths Institute, established for the study of ancient Egypt and the Near East, just before the Second Great War.

The British Museum maintains an organization that is proportioned to modern requirements. In addition to publishing handbooks and guides to the archaeology of various periods, it has a highly trained technical staff for the preservation of antiquities.

The first of the newer universities to take up this subject, Liverpool, early in this century established an institute with three chairs in classical archaeology, Egyptology, and the methods and

practice of archaeology. Edinburgh, which in 1882 had established a chair in Celtic language, literature, and antiquities, followed this by setting up the Abercromby chair in prehistoric archaeology in 1926. In Eire, Dublin set up the first chair in Celtic archaeology. This was followed by the University Colleges of Cork and Galway establishing professorships in archaeology and Celtic archaeology. Other British universities, e.g. Durham, Leeds, Cardiff, Belfast, have courses of lectures in archaeology.

Archaeology of Western Asia

Another development was the British School of Archaeology at Jerusalem, the object of which is to promote the study of the archaeology of Western Asia in a manner worthy of the opportunity afforded by the First Great War. The Palestine Exploration Society had a fine record in pioneer research. The names of Conder, Warren, Kitchen, Macalister, and many others are still familiar. The new school was founded by the British academies in concert with this society. It aims at facilitating and organizing practical investigation, at training and equipping explorers for this work, as well as providing instruction and guidance for those pursuing special studies.

Another school founded since the First Great War is the British School of Archaeology in Iraq, whose main work has been the publishing of a journal of the same name. The British School of Egyptian Archaeology founded by Sir Flinders Petrie has published a vast series of excavation reports on Egyptian and Near Eastern subjects. There are two other British Schools of Archaeology, those at Rome and Athens, but they do not fall within the province of this article.

PRACTICAL ARCHAEOLOGY. The whole function of a practical archaeologist is threefold: (a) investigation, (b) exposition, (c) interpretation. The first may be regarded as his special function, the second as his inalienable duty, the third as his academic opportunity.

Investigation includes exploration, excavation, examination of material, whether concrete or documentary, comparisons, analyses, and all that contributes to the increase of material information.

Exposition is the making public of the results of investigation. The archaeologist who fails to offer the community the fruits of his investigations fails in his elementary public duty. The ex-

cavator, in particular, to whom the opening of ancient ground is entrusted, accepts in this regard responsibilities which involve not only the preservation of antiquities and monuments disclosed, but all information derived from the association of remains and their relative positions in the ground. Exposition may be effected by arrangement and classification of material remains in museums, conservation of sites, or publication of plans, photographs, and memoranda.

Interpretation is the further synthetic treatment of the materials rendered available by investigation and exposition. Such treatment will involve the domains of anthropology and of history, and will demand a preliminary handling by specialists according to the subjects involved. A modern excavator surcharged with the duties of personal observation and attention to details can rarely obtain the leisure necessary or acquire the knowledge essential for final interpretation of his results. But the excavator's personal impressions are irreplaceable; hence collaboration and organization are almost indispensable.

The Archaeologist's Training

Proportionately to the general progress of archaeological method, the processes of practical archaeology have become increasingly scientific, involving an adequate general training together with special training in architecture, draughtsmanship, photography, ceramics, mechanics, surveying, petrology, etc., and a knowledge of arts and crafts.

EXCAVATION. The days are past when sites may be recklessly turned over in search of archaeological treasure. The most learned professor or enthusiastic amateur untrained in excavation, digging in rubbish heaps outside a city wall, may destroy by inexperience or ineffective supervision during one minute the stratification that would have illustrated to the expert not only the development of the city, but the evolution of a civilization. An excavator's dominating ideal should be so to preserve every object, so to record every position, that it might be possible for some one else working upon his exposition to replace everything accurately where it had been found. This precept applies to the stratification of the earth and debris no less than to the superposition of more tangible remains. The relation of each to the whole is the key to correct interpretation. The excavator must preserve an

open mind, free from preference for one class of evidence over another, ready and desirous always of testing points of view that differ from that towards which his human temperament may tempt him to incline.

Faced with the duty of recording even that which he cannot perceive, the excavator calls the camera to his aid, and by a regular series of photographs registers the stages of his work commencing with the surface. In this he has been greatly assisted by the development of air photography, which reveals the shape of buildings invisible from the ground.

Methodical Excavation

An excavator's first considerations in attacking a new site will be his criteria. If his site be a deserted Syrian mound, he will examine other mounds still in occupation, and will also study the results of others who have excavated similar mounds. If his site be a Roman fort in the northern or western frontier of Britain, he will study the different examples already brought to light, noting particularly the differences in plan and construction. In either case he will familiarise himself with the types of common objects, among which the potsherds are at once the most numerous and the most instructive. His imagination will then be able to trace out the processes by which the site may have developed its present appearance, so that he is working mentally from the bottom to guide his hand in proceeding from the top.

In the case of a Syrian mound, it may be conjectured that a natural knoll was occupied in antiquity by its primitive settlers. The original form of the mound remains undetermined. His imagination can usefully follow up the normal processes of decay, repair, destruction, restoration, with the ever-rising accumulation of walls and floors and debris. The body of the mound will be composed of disintegrated bricks of mud, which he will have to distinguish from standing walls of the same material, often difficult in the case of those partly ruined. There will have been periods, too, when the mound after some shock, or for other reasons, was abandoned, leaving its habitations and main walls partly in ruins. Natural decay would ensue with successive rains. New-comers would then partly level up and rearrange the buildings, using in some cases old walls as foundations, in other cases digging foundation trenches through the pre-existing floors, lay-

ing up new and delicate problems which the excavator must solve.

The second series of observations will be directed to the surface of the mound, seeking for the line of demarcation between the natural and the artificial, noting everything that might suggest intrusion, testing and recording the angles of its slopes. He will recognize the natural angle of rest of accumulated earth, an angle which varies with the tenacity of the soil. When the slope is steeper, he will suspect the presence of existing, though buried, walls; where it dwindles away, he may infer usage in more recent times. The rain-washed surface and the foot of the mound will present a shallower angle.

The Excavator's Guiding Principles

His third considerations will be of a technical order—organization of staff, the disposition of workmen, the placing of apparatus, the disposal of debris, the preservation of what must not be destroyed.

Trial sections will aid materially in solving all of these technical problems. Such exploration sections, whether up the slope or upon the surface, should run diagonally to avoid difficulty with the debris, which in the preliminary examinations he will place along the lower side of the trenches and on the surface, because the presence of various walls, assuming them to be roughly parallel, will be more easily detected. A parallel trench might fall between walls. Walls, when discovered, should be followed by cross cuts. They will expose, upon the slope, the foot of the artificial mound and at intervals the position of the enclosure walls. Upon the shoulder they will be especially instructive. The nature of the walls, the styles of building, the character of potsherds and small objects will be noted. Upon the surface long trenches extending over the shoulder, descending from half a metre to two metres with occasional deep shafts when no floors are found, will establish a number of local criteria and provide the basis for the plan of campaign. The sides of such cuttings should be examined minutely at successive stages as they dry out. The excavator should not be tempted to enlarge upon them—as, for example, by following up individual walls which they may cross—until their completion. It is, indeed, inadvisable, as a rule, to follow walls at first sight.

When a room has thus been located by cross cuts, trial shafts should determine the depth of its floor, the real relation between

floor and wall, and the striation of the filling of the chamber. The earth should then be removed layer by layer, not necessarily horizontal, down to the level which indicates contemporary occupation. The clearing of the chamber will then proceed minutely and by hand. The main walls, if any, around the mound should only be bared after section cuttings have determined their relation to the stratified deposits outside and to the successive building periods within. It is a useful precept, in seeking for a wall face, to approach the suspected position from a distance, digging relatively deep and letting the surface earth fall in untouched. The face of the wall will thus disclose itself, whereas it might otherwise have been damaged. Workmen should not, as a rule, be informed of the expected position of walls.

Clearance rather than excavation is hardly ever justifiable; blown sand almost alone can be safely dealt with in bulk. In this way buildings and tombs in Egypt often present simpler problems and a suitable training ground for students. The blown sand from the tomb shaft is passed through sieves, and the burial chamber, when reached, will be cleared by hand. Superposition of burials, though not common, will provide practice in detecting strata. More commonly tombs were partially cleared out in antiquity before re-use, and the great majority have been disturbed more recently by plunderers. The grouping of objects in a series of tombs is not less important in establishing morphological sequence upon the basis of average association.

Three Fundamental Formulae

The excavation of Roman forts in Great Britain is another relatively simple class of problem. The principles to be observed will be generally the same, except that there is, presumably, no slope or mound other than the natural contour of the site. The problem of tracing the ground plan becomes secondary to that of the minutiae, on which all attention should be concentrated. The importance of minor objects is their relation to the whole.

Three general formulae are of a fundamental character: (1) Study the criteria, (2) Examine by sections, (3) Dissect by layers. For the rest the general methods of archaeology apply. The position of each object found, whether important or not, is to be recorded in due relation to its surroundings.

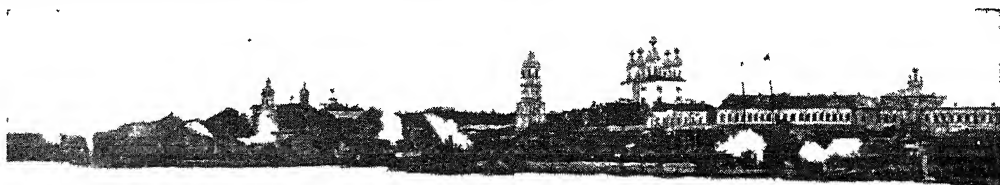
whether as part of a layer or directly referred to some determined base, like a floor or wall. The generous use of the camera and sketches, and the prompt recording of observations and impressions as the work proceeds, are the safeguards of a conscientious excavator.

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Archaeopteryx (Gr. *archaios*, ancient; *pteryx*, wing). Primitive lizard-tailed bird. About the size of a pigeon, its fossil remains are found in the Upper Jurassic lithographic stone of Bavaria. The jaws were furnished with conical teeth, showing affinities with the Reptilia. The wings were small for the size of the animal and exhibited three digits, each of which terminated in a claw. The hind limbs were characteristically those of a bird. The vertebral column extended to form a long tail, from each vertebra of which was given

flowers. It is also sometimes given to *L. album*, with white flowers. All of these plants belong to the genus of labiates commonly known as dead-nettles, owing to the superficial likeness of their leaves to those of the stinging-nettle (*Urtica*). They are found growing along hedges and about waste land. The names archangel and archangelica are also sometimes given to the umbelliferous plants more frequently known as angelica (*q.v.*).

Archangel Seaport and city of N. Russia. Near the mouth of the Dvina and the head of the Gulf



Archangel. Russian seaport on the Dvina at the head of the Gulf of Archangel. It is ice-free from June to September. Dome-topped towers and spires are characteristic of its architecture

ology. D. G. Hogarth, 1899. *Diospolis Parva*, W. M. F. Petrie, 1901. *Primitive Culture*, E. B. Tylor 4th ed. 1903; *Methods and Aims in Archaeology*, W. M. F. Petrie 1904; *Anthropology*, E. B. Tylor repr. 1904; *Bronze Age Pottery of Great Britain*, J. Abercromby 1912, *Prehistoric Thessaly*, A. J. B. Wace and M. Thompson, 1912. *The Glastonbury Lake Village*, A. Bullied and H. St George Gray 1915-16; *Tools and Weapons*, W. M. Flinders Petrie, 1917. *Man and his Past*, O. G. S. Crawford, 1921. *Studies in the Early Pottery of the Near East*, H. Frankfort, 1925-27; *Prehistoric and Roman Wales*, R. E. M. Wheeler, 1925; *Our Early Ancestors*, M. Burkitt, 1926; *The Upper Palaeolithic Age in Britain*, D. A. E. Garrod 1926, *Wessex from the Air*, O. G. S. Crawford 1928, *The Danube in Prehistory*, V. Gordon Childe, 1929. *The Bronze Age*, V. Gordon Childe 1930; *The Archaeology of Roman Britain*, R. G. Collingwood, 1930. *Archaeology in England and Wales 1914-31*, T. W. Kendrick and C. F. C. Hawkes, 1932, *The Old Stone Age*, M. Burkitt 1933; *New Light on the Ancient East*, V. Gordon Childe, 1934; *Wonders of the Past* ed. Sir J. Hammerton (2 vols.) 1934; *The Mesolithic Settlements of Northern Europe*, J. G. D. Clark 1936. *The Personality of Britain* Cyril Fox 3rd ed. 1938. *The Archaeology of Crete*, A. Pendlebury, 1939; *The Dawn of European Civilization*, V. Gordon Childe, 3rd ed. 1939. *Archaeology and Society*, J. G. Clark, 1939. *The Prehistoric Foundations of Europe to the Mycenaean Age*, C. F. C. Hawkes 1939

off a pair of opposite quill-teathers. The whole body appears to have been covered with feathers, impressions of which are preserved in certain specimens *e.g.* one formerly in the Berlin museum.

Archangel (Gr. *archi*-, chief. *angelos*, angel). The title of the highest order of angel. The Jews named seven. Michael, Gabriel, Raphael, Uriel, Chamuel, Jophiel, and Zadkiel, the last three being unrecognized in the Christian Church. The first two are mentioned in the A.V.: Michael, *i.e.* "who is like God," Dan. 10. Jude. and Rev. 12: Gabriel, *i.e.* Man of God, Dan. 8 and 9: and Luke 1. Raphael, *i.e.* "God has healed," is referred to in Tobit, and Uriel, *i.e.* "light of God," in 2 Esdras 4, 5, 10. Chamuel means he who sees God. Jophiel, the beauty of God, and Zadkiel, the righteousness of God. See Angel.

Archangel. In botany this is a popular name given to two common



Archangel. *Lamium Galeobdolon*, the yellow dead-nettle

British wild flowers, both belonging to the family of Labiatae, and are respectively *Lamium Galeobdolon* and *L. purpureum*, the first with yellow and the other with purple

flowers. It is also sometimes given to *L. album*, with white flowers. All of these plants belong to the genus of labiates commonly known as dead-nettles, owing to the superficial likeness of their leaves to those of the stinging-nettle (*Urtica*). They are found growing along hedges and about waste land. The names archangel and archangelica are also sometimes given to the umbelliferous plants more frequently known as angelica (*q.v.*).

The place was visited in 1553 by Sir Richard Chancellor, the town being founded in 1584. During the First Great War it was a supply base for the Russian army and the scene of two explosions causing casualties among British subjects. In 1918 it was occupied by an Allied force opposing the Bolsheviks. During the Second Great War it became one of the chief ports for reception of Anglo-American war materials brought to Russia by Arctic convoys, 1942-43.

ARCHANGEL EXPEDITION of 1918. In the spring of 1918 the Allies of the First Great War decided to occupy Archangel and Murmansk, together with the Murmansk Rly. Their object was to safeguard against attack by the Red Army the huge accumulation of military stores at Archangel, and to facilitate if possible

the reconstitution of an eastern front against Germany by eventual contact with Czecho-Slovak forces and Admiral Koltchak's White Army W. of the Urals.

Murmansk was accordingly occupied by British, French, and U.S. troops in June-July. Allied warships, overcoming Red Army opposition, anchored in Archangel harbour on Aug. 2. and British troops entered the city next morning. Further British detachments were landed at Onega Bay, S.W. of the White Sea. After spasmodic fighting, the Allies, under General Ironside, had occupied by the winter a curve of territory which was deepest at Shenskursk, about 180 m. S.E. of Archangel. They were driven from Shenskursk on Jan. 24, 1919, and were forced to make other minor withdrawals during the ensuing months. A general Red Army offensive in May was completely repulsed, and a first contingent of reinforcements, consisting of British volunteers, reached Archangel. But the British government had meanwhile decided, early in March, to evacuate both Murmansk and Archangel. Allied policy became limited to the equipping of local anti-Bolshevik Russian forces (about 23,000 men) and subsequent withdrawal under cover of an offensive. Lord Rawlinson was appointed supreme commander to coordinate the withdrawals, which began in June. In July the Red Army was defeated on the Dvina and at Yemtsa. Evacuation proceeded through Sept. and on Sept. 27 the British naval base at Archangel was closed. Evacuation of the Murmansk area was completed by Oct. 12, 1919.

Archangel, *GULF OF*. Bay of N. Russia. An inlet of the White Sea, it extends inland about 65 m. and receives the waters of the Dvina.

Archbishop (Gr. *archi-*, chief: *episkopos*, overseer). Principal bishop of a province, who while governing his own diocese presides over the bishops of a group of dioceses. Athanasius (d. 373) so described himself and his predecessor in the diocese of Alexandria, but the term was not strictly used in its present sense before the 6th century, and the date of its origin cannot be fixed. The titles of archbishop and patriarch were once interchangeable: archbishop and metropolitan are still identical.

The design of Pope Gregory I to divide Britain into two sees, London and York, was abandoned because Kent was the first part of

the kingdom to receive Christianity. Augustine was the first archbishop of Canterbury, but the claim of the holder of the see to be primate of all England was not definitely settled until 1353. Lichfield in the 8th century and St. Davids in the 12th had archbishops. Paulinus, as bishop of Northumbria, held the pall or pallium of an archbishop, 625-33. The first archbishop of York was Egbert (732). Irish bishops received consecration from Canterbury until 1152, though Ferns was once archiepiscopal. In 1470 Pope Sixtus IV created the bishop of St. Andrews archbishop and metropolitan of all Scotland.

In the Church of England the archbishop of Canterbury is primate of all England and metro-



Archbishop. The Primate of All England in his robes

politan. He ranks as a prince immediately after the princes of the blood royal and before all other subjects. He has the right of crowning the sovereign. His brother of York, as primate of England, has precedence of all dukes save those of the blood royal and all officers of state save the lord chancellor, and the right of crowning the queen consort. In speaking and writing they are given the title of Grace and Most Reverend Father in God, and write themselves "by divine providence," with, as signature, their Christian name followed respectively by Cantuar and Ebor, abbreviations of the Latin forms of Canterbury and York. The archbishop of Canterbury has under him all bishoprics in England, except those of Durham, Ripon, Chester, Newcastle Wakefield, Liverpool, Manchester Carlisle, Sodor and Man, Sheffield, Blackburn, Southwell, and Bradford, which are in the province of York. The Protestant archbishop of Armagh is primate of all Ireland; the archbishop of Dublin is primate of Ireland. On the disestablishment of the church in Wales, which came into effect March 31, 1920, Wales was constituted a separate province under its own archbishop, who is chosen out of the six bishops.

The episcopal church of Scotland has no archbishop, but its bishops elect a primum of their number to whom is given metropolitan authority. In the British Empire overseas there are Anglican archbishops in *Canada*: Toronto, Nova Scotia Rupert's Land, Ontario, British Columbia, *Australia*: Perth, Sydney, Melbourne, Brisbane. *New Zealand*: Christchurch; *S. Africa*: Cape Town; *India*: Calcutta; and in the West Indies.

In England and Wales there are four Roman Catholic archbishops: Westminster, Cardiff, Birmingham, and Liverpool. In Scotland, two: St. Andrews and Edinburgh, and Glasgow in Ireland, four: Armagh, Dublin, Cashel and Tuam; in Canada, fourteen; ten in India; one in Ceylon; seven in Australasia. In the U.S.A. there are twenty-one R.C. archbishops, but no Protestant holder of the title. See Episcopacy.

Archchancellor (Latin *archicancellarius*). A dignity of the Holy Roman Empire. The archbishops of Mainz, Cologne, and Trier (Trèves) were respectively archchancellors for Germany, Italy, and the kingdom of Burgundy or Arles. They were merely chancellors who received a higher title on account of the greater importance of their office. The archchancellorships of Italy and Arles gradually declined in importance, but that of Germany lasted until the dissolution of the Empire in 1806. See Chancellor.

Archdeacon (Gr. *archi-*, chief: *diakonos*, minister). Official of the early Christian Church and existing today in the Roman Catholic but more especially in the Anglican Church. As the name suggests, he was chief of the deacons serving a cathedral. First appearing in the 3rd century, archdeacons were soon the chief assistants of the bishops, their special duties being to look after clerical morality, church buildings, etc., and in general to relieve the bishops of much detail work. In the 11th century districts were allotted to them, and their authority, thus encouraged, grew at the expense of that of the bishops, until they became practically independent, with full control over the secular or administrative side of the Church's work. It was then that they earned an unenviable notoriety for rapacity and harshness towards the lower clergy, evidenced in the question of the medieval schoolmen: Can an archdeacon be saved? Roman Catholic archdeacons are titular dignities,

their only duty being to present candidates for ordination.

In the Anglican Church, on the other hand, the archdeacon is still a prominent official, for, having come in with the Normans, he survived the vicissitudes of the Reformation. Before 1836 there was one for each diocese, but afterwards the number was increased to two or four, each having his own archdeaconry. Their duties include the visitation of the parishes, the supervision of church buildings, the hearing of cases in their courts, and the admission of churchwardens. They are members of Convocation and almost invariably hold a canonry or other living in the diocese. In order to be appointed an archdeacon, one must have been for six years a priest. Archdeacons are appointed by the bishops. See Church of England; Ecclesiastical Law.

Archduke (Gr. *archi-*, chief. Lat. *dux*, leader). Title long borne by princes of the family of Hapsburg, rulers of Austria. It was assumed about 1358 by one of the dukes of Austria and from that time that country's rulers were always known as the archdukes. Later came the practice of calling all the princes of the Hapsburg family archduke and so we have the archduke Charles, the archduke Francis Ferdinand, and others who were not rulers. The title has never been borne by any other family. The archduke Otto (b. 1912), eldest son of the last emperor, Francis Charles, became the claimant to the Austrian throne on the death of his father, 1922.

Archelaus. King of Egypt. Of the Ptolemaic dynasty, he was a son of the Cappadocian Archelaus, one of Mithradates' generals, and Pompey made him high-priest of Comana in Pontus. In 56 B.C. he wedded Berenice, daughter of Ptolemy Auletes, who had been raised to the throne in place of her father, but after six months both were slain, during an invasion led, at Ptolemy's instigation, by the Syrian proconsul Aulus Gabinius.

Archelaus. Ethnarch of Judaea, son of Herod the Great by the Samaritan Malthace. His succession being disputed by his brother Antipas, to whom Judaea had been assigned by an earlier will, Archelaus appealed to the Roman emperor Augustus, who in 4 B.C. made him ethnarch of Judaea, Samaria, and Idumaea, and Antipas tetrarch of Galilee and Peraea. For his cruelty and marriage with his brother's widow he was deposed c. A.D. 7

and banished to Gaul. A tradition existed that he was the nobleman mentioned in the parable of the ten pieces of money (Luke 19).

Archelaus. King of Macedonia, 413-399 B.C. He introduced Greek culture into his country, constructed roads and built towns, and reformed the army. The dramatist Euripides and the painter Zeuxis were resident at his court.

Archer, FREDERICK JAMES (1857-86). British jockey. He was born at Cheltenham, Jan. 11, 1857, and as a boy of 13 rode Athol Daisy to victory in a nursery race at Chesterfield in 1870. Altogether he rode in 8,084 races and won 2,748, heading the list of winning jockeys from 1873 to 1885. He was successful in five Derbys, six St. Legers, and was on the back of four Two Thousand and Oaks winners. He shot himself when lying ill of typhoid fever at Falmouth House, Newmarket, Nov. 8, 1886, and was buried at Newmarket.

Archer, WILLIAM (1856-1924). British dramatic critic and author. Born at Perth, Sept. 23, 1856, he

Fred Archer,
British jockey



William Archer

was educated at Edinburgh. He came to London in 1878 after travelling in Australia in 1876-7. He was dramatic critic to many journals including The London Figaro, The World, The Tribune, The Nation, and The Star. It is, however, as a disciple of Ibsen that he was best known. He edited Ibsen's prose dramas in five volumes and the complete works in 11 volumes, besides collaborating in a translation of Peer Gynt. He was also the author of a Life of W. C. Macready, 1890. Poets of the Younger Generation, 1902; Through Afro-America, 1910; The Old Drama and the New, 1923 and other books; also a drama, The Green Goddess, and other plays. He died Dec. 27, 1924. *Consult* William Archer, his Life, Work and Friendships. C. Archer, 1931

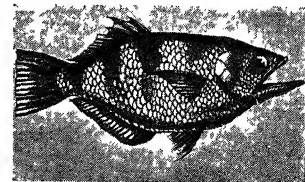
Archer Fish. Name of a small East Indian fish. It is so called from its power of squirting drops of water from its mouth at its prey

which consists of small insects. One species, *Toxotes jaculator*, has been known to squirt a drop of water as far as 5 ft.

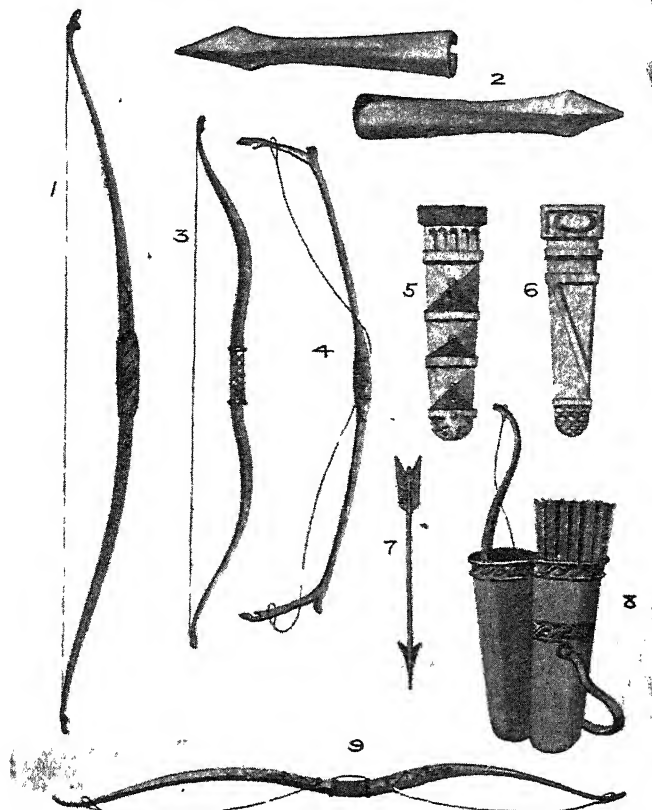
Archery. Art and practice of shooting with a bow and arrow. Employed from the earliest times in warfare and hunting throughout the world until invention of gunpowder, it is now indulged in only as a pastime. It was revived as such in 1780 by Sir Ashton Lever and some friends at Leicester, and in 1781 the Royal Toxophilite Society was founded ever since regarded as the controlling authority. The Royal Company of Scottish Archers, which constitutes the sovereign's bodyguard for Scotland, dates from c. 1650. The Honourable Artillery Company of London originated with a body of archers established by Henry VIII.

The implements used for the sport in its modern form comprise the bow, arrows, tips for covering the fingers, the bracer or arm-guard, and the target. Bows, if made of one piece of wood, are termed "self"; but if composed of two or more strips of wood glued are described as "backed." The former are invariably made of yew, the latter of various combinations. The length of a woman's bow should be about 5 ft. 6 ins., that of a man's 6 ft. The strength of a bow is reckoned by the number of pounds it takes to pull it a distance (from string to bow when fully bent) of 25 ins. in the case of a woman and 28 ins. in that of a man. The former bow would be marked 25 lb., the latter 48 lb.

Arrows are made of deal, of four different shapes; either they are of the same thickness from end to end, or are barbed or tapered in different parts. The feathers with which they are winged are either of the straight pattern or parabolic variety. Tips are leather protections for the fingers of the right hand; they should fit accurately. The bracer is the leather guard strapped on the left arm to protect it from the recoil of the string after the arrow is released. The target is circular, 4 ft. in diameter, stuffed with straw, having a canvas face on which are painted



Archer Fish, which shoots its insect prey with squirted drops of water



Archery. 1. Early English bow, period Edward IV. 2. Two English arrowheads. 3. Grecian bow. 4. Bow of whalebone and wood, N.W. American. 5. Egyptian quiver. 6. Greco-Egyptian quiver. 7. Egyptian arrow. 8. Theban bow-case and quiver. 9. Etruscan bow

five rings: the centre or bull's-eye being gold (technically called the gold), then red, blue, black, and white, and counting respectively 9, 7, 5, 3, and 1. The distances shot over vary from fifty to one hundred yards.

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Arches, COURT OF. An English court of law, so named from being held in the church of S. Mary-le-Bow (*Maria de Arcubus*). It is the appellate court of the archbishop of Canterbury as metropolitan of the see of Canterbury. The presiding officer is commonly called dean of the arches, though his real title is official principal. He must be a judge, or ex-judge, or a barrister at least 10 years in practice. Most important ecclesiastical cases are decided in this court, from which there is an

appeal to the Privy Council. *See* Ecclesiastical Law.

Archibald, JAMES FRANCIS JEWELL (b. 1871). American war correspondent. He was born in New York, Sept. 22, 1871, and attended Ohio Wesleyan university. He served in the Spanish-American war of 1898, was with the British in the Sudan, 1899, and with the Boers, 1900-1. He represented Collier's Weekly in the Russo-Japanese war of 1904-5, and reported other fighting in Morocco, Albania, and China. In 1915, engaged as a correspondent with the Central Powers, he was detained by the British govt. on his way to Europe, but he was released and returned to the U.S.A. after his dispatches had been confiscated.

Archidamus. Name of five kings of Sparta. The first ascended the throne about 630 B.C. The second reigned 42 years from about 469; he crushed the helots, and in 431 led armies into Attica, where he ravaged Athenian terri-

tories. He was the father of Agesilaus (*q.v.*), whose son, the third Archidamus, became king in 361. Ten years earlier this latter had laid waste Arcadia, and in 362 had successfully resisted Epaminondas. He died in Italy in 338. His grandson, fourth of the name, was captured by Demetrius Poliorcetes in a battle near Mantinea about 296. Archidamus V, last of his line, acceded on his brother's murder in 240 B.C. He fled to Messenia, but was recalled and soon put to death by the same assassins.

Archidona. Town of Ecuador, in Napo Pastaza prov. It stands near the Napo, 121 m. E.S.E. of Quito. Established about 1556, it became a centre of the Jesuit fathers, who were expelled in 1767 but returned a century later. It trades in rubber, timber, feathers, and vegetable ivory.

Archil or **ORCHIL.** Purple dye prepared from various lichens of the genus *Roccella*. It appears in commerce as archil, a pasty mass, persis, a drier paste; and cudbear, a red-brown powder. The art of dyeing with archil was discovered by a citizen of Florence, who adopted the name Rucellarii or Oricellarii. The lichens from which the dye is prepared grow on the coasts of warm and tropical regions, e.g. the Mediterranean, Canary Islands, Zanzibar, Ceylon, and Java.

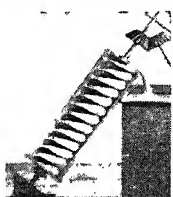
The dye is prepared by treating the finely chopped lichens with dilute ammonia and keeping at the temperature of the air until a dark violet paste forms. The mass is then thinned with more ammonia and pressed, the liquid obtained being blue archil. Red archil is obtained by heating this solution, when the ammonia is driven off. When carbonate of soda is used, litmus results. After the discovery of aniline dyes archil lost its importance. *See* Dyes.

Archilochus (c. 700 B.C.). Greek lyric poet. He was an Ionian of Paros by birth, and went to Thasos in early life. There he wrote the verses satirising the family of Neobule, whose father Lycambes had forbidden her marriage with Archilochus after giving his consent. According to the story, Neobule and her sisters were so overwhelmed with shame that they hanged themselves. The latter part of the life of Archilochus was spent at his native Paros, and he died fighting in a war with the people of Naxos. Only fragments of his poetry survive, but he was regarded as one of the great poets of Greece,

and, incidentally, the first to perfect iambic verse, especially as a vehicle of sarcasm.

Archimandrite (Greek *archi-*, chief; *mandra*, fold). Title in the Eastern Church for the superior of a monastery, or for an abbot who presides over more than one monastery. It dates from the 4th century. See Greek Church.

Archimedeian Screw. Device used to raise water to a higher level. Its invention is attributed



Archimedeian screw, for raising water

to Archimedes (q.v.). In form it consists of a cylinder in which a spiral screw revolves, and it is an essential principle that the lowest point of one thread must not be higher than the highest point of the thread immediately below. The cylinder was placed with its lower end in water, and with its body inclined at an angle that met the condition mentioned. Then by rotating the spiral screw by a handle usually placed at the upper end, water was raised through the long spiral chamber formed by the screw in contact with the internal wall of the cylinder. When the water reached the top of the cylinder it flowed out at the higher level.

Archimedes (c. 287–212 B.C.). Greek mathematician. Born at Syracuse, Sicily, he wrote on nearly all the mathematical subjects known in his period, and his theory of the lever supported the science of statics for some 1,700 years, until the time of Stevinus (A.D. 1586). His theory of hydrostatics was nearly as long-lived for little advance was made in it until Stevinus investigated the pressure of liquids. His geometrical discoveries of the quadrature of a parabolic area, and of a spherical surface, as well as of the volume of a sphere, were notable achievements. The Romans, at whose hands he fell during the capture of Syracuse, erected a tomb to him on which was engraved the figure of a sphere in its circumscribing cylinder.

Among his numerous extant writings, consisting of detached essays, are three on plane geometry—on the circle, the parabola, and spirals; two on three-dimensional geometry—on the sphere and cylinder; two papers on arithmetic; and two works on mechanics and hydrostatics. His hydrostatics recalls the famous story that once he ran naked from

the bath through the streets of Syracuse shouting Eureka! (I have found it!). The discovery prompted by the upward pressure of the water on his body in the bath, was that equal weights of different metals, such as gold and silver when weighed in water will no longer appear equal. Each seems lighter than before by the weight of water displaced, but the bulkier metal, silver, will suffer in water a greater diminution in weight.

The discovery, according to the story, was utilised to detect the introduction by a fraudulent goldsmith of some silver into a golden crown made for King Hiero.

The Archimedeian screw for raising water, and the apocryphal burning glasses which set fire to ships by focussing the rays of the sun on their sails, are attributed to him. His works have been edited in modern notation by T. L. Heath, 1897.

Archipelago (Gr. *archi-*, chief; *pelagos*, sea). Name originally given to the island-studded Aegean Sea. It is now applied generally to groups of islands, e.g. the East Indian Archipelago.

The islands familiarly known as the British Isles are strictly an archipelago, which rises above the shallow continental shelf of Western Europe. This fact is an illustration of the circumstance which gives a geographic unity to an archipelago: the islands are all joined by submarine shelves, banks or ridges; the West Indian

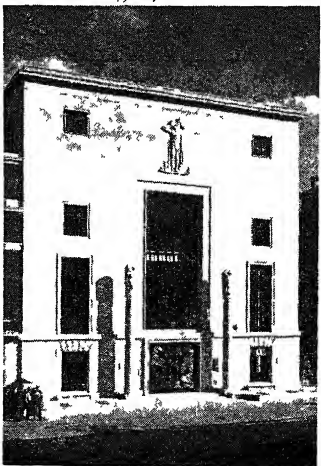


Archimedes, Greek mathematician

Archipelago, for instance, comprises the remnants of the ancient Antillean continent, most of which has been submerged. Archipelagos have been of considerable importance in the history of civilization; it would be difficult to estimate the value of the Aegean Archipelago in the development of the might of ancient Greece; one of the chief factors in the growth of Britain has been the fact that it is an archipelago.

Architect (Greek *archi-*, chief; *tekton*, worker). Term for a master builder in classical and medieval times, and at present for one who designs buildings and superintends their erection. The master builder's business was to prepare plans of a building, he was responsible for the materials used, and exercised a general superintendence over the workmen. Thus he had to combine in his own person the functions that are now distributed among the architect, builder, contractor, clerk of the works, and artisan. In addition, he fulfilled the duties of a civil and military engineer, involving both a practical and philosophical knowledge of mathematics and mechanics; the Italian architect of the 15th and following centuries was sculptor and painter as well. In the later days of Roman art there were isolated instances of architects designing works without being charged with the responsibility for their execution, but, generally speaking, the architect was then, and subsequently, a master builder. His expenditure was subject to control by the municipal officer of the province, by a senator or other civil functionary, by some army officer of high rank, and sometimes by a resident board; otherwise he appears to have had sole responsibility.

Josephus states that for the third temple of Jerusalem Herod supplied a thousand priests expert in building and ten times that number of workmen, and Polybius mentions the sending of one hundred architects to Rhodes. This suggests the existence of an immense number of practitioners and correspondingly a rather low standard of attainments; nor is there much mention of architectural training until the time of Constantine, who was so much disappointed with his "architect's" failure to interpret his own building schemes that he ordered the governors of the provinces to institute schools and appoint professors. Few names of these classic architects have come down to us. Indeed, the classic Italian authors mention none before 200 B.C., and it is not until the Renaissance that anything like full justice is done to the men who planned and



Architect. Façade of the Royal Institute of British Architects, Portland Place, London, W.

Courtesy of R I B A.

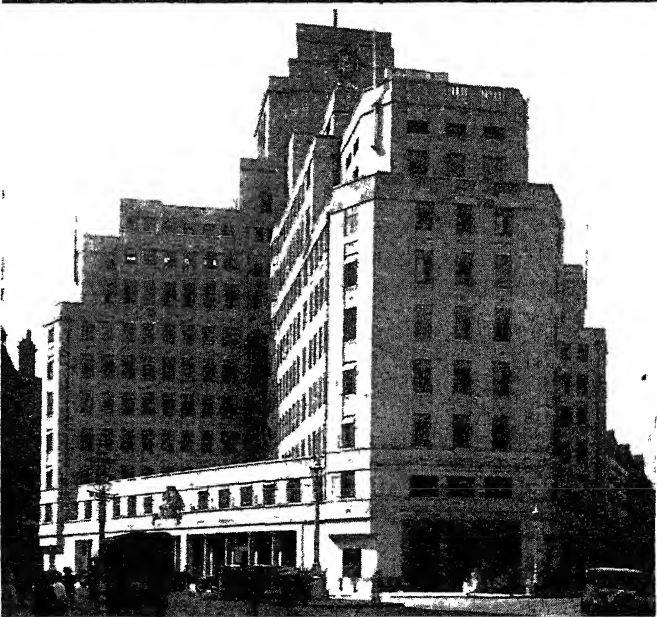
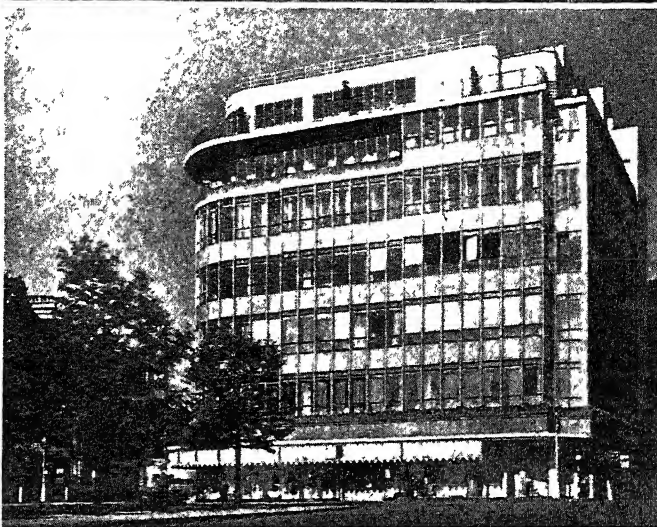
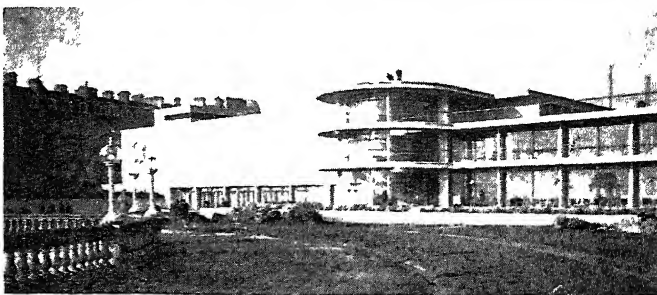
carried out noble buildings. There is a similar obscurity about the early Gothic master builders, and even about the pioneers of the Renaissance in France.

It is not until the 17th century that the modern architect—i.e. a person competent to design and superintend the execution of buildings, without having undergone the manual part of an artisan's training—can be separated from the master builder. Inigo Jones was not only one of the greatest but also one of the earliest of British architects.

The divorce of architect from builder has not proved an un-mixed benefit, since a century ago it produced a number of architects whose qualifications were mainly academic. But architectural training today is well guarded by the various professional institutions, and the tendency is to insist on a practical no less than a theoretical knowledge of the art of building.

Since 1940 nobody in the United Kingdom is legally entitled to practise under any name containing the word "architect" unless he or she is registered. This does not apply, however, to a "naval architect," "landscape architect," or "golf-course architect," nor to certain people employed in local government work. The register is maintained by the Architects' Registration Council. A name may be expunged from the register on account of misconduct, but appeal against this may be made to the High Court (in England) or the Court of Session (in Scotland).

Architects, ROYAL INSTITUTE OF BRITISH. The chief architectural society of Great Britain and N. Ireland. It was founded in 1834 as the Institute of British Architects, endowed with a charter by William IV in 1837, and permitted to use the prefix Royal by Queen Victoria. At the same time a royal gold medal for the promotion of architecture was instituted; this is awarded every year to an architect of distinction, British or foreign. The Institute is conducted under a new charter granted in 1889. The constitution provides for a president and council, fellows, associates, and licentiate members, the last consisting of those who have passed neither the preliminary nor other examination held by the Institute. Associate-ship follows the passing of the final examination. In certain cases, architects of reputation who have not been through the Institute's course of training are elected associates or fellows. The offices are at 66, Portland Place, London, W.1.



Architecture. Three buildings which show the modern trend in Great Britain. Top, De la Warr Pavilion, Bexhill (1936). Centre, Peter Jones's department store, Sloane Square, London (1934-38). Bottom, London Transport offices, St. James's Park Station, London (1929). See p. 568 *et seq.*

Photos, 1, Judges' Ltd., 2 and 3, courtesy of Peter Jones, Ltd., and I T E.

ARCHITECTURE: BUILDING AS A FINE ART

Sir ERNEST GEORGE RA Past President, R.I.B.A.

This article and the one on Modern Architecture immediately following deal with the excellence attained by man as a builder. They are supplemented by subsidiary articles e.g. Gothic Mahomedan Renaissance Rococo etc. Arch. Cathedral House Wren and other great architects Town Planning etc.

Architecture is not mere building. It is not dependent upon size or importance nor on the quality of material, whether of brick or of marble, neither does it depend upon decoration, for some buildings of the severest type charm simply by the beauty of proportion while those that most often offend are the over decorated. It is the result of the artist's knowledge and skill brought to bear on his work, giving it distinctive character and style and raising it to the rank of an art—of architecture. The art includes the building of fortifications and in a wider sense of ships, and in these it generally possesses the element of constructive fitness and suitability to its purpose which are essential qualities in architecture.

Landmarks of Ancient Races

When the instinct for shelter in rock caves and wigwams ceased to satisfy our forefathers, they built themselves walls of mud or of sun baked clay, with boughs for roofs. They used stones from the rock side, shaped trees from the forest, until, with growing skill a system of building was developed. It is questioned whether the beginning was made on the Tigris or the Nile, but it is in Egypt that we find substantial evidence of a highly civilized people with a distinct architectural style and one that remained with them for four or five thousand years, with only unimportant variations.

Contemporary with the Egyptian civilization were the Babylonian, Assyrian, and the Aegean, whose centre was Crete. Of the last the excavations at Knossos show the scale and grandeur of a royal palace, while in the Louvre may be seen the pictured walls of the palace of Darius in vitrified tiles. The Pyramids are the most definite memorials of man's early works. These vast monuments with their simple form and scientific construction have remained almost in their completeness. The rock hewn Sphinx that after countless ages, still overlooks the desert, remains an inscrutable mystery. The tombs of the sacred bulls near Memphis and their huge porphyry sarcophagi are among the most impressive landmarks of an ancient race.

EGYPT Ascending the Nile to Thebes, we meet with veritable architecture. The temple of Karnak spreads over more space than

any known building and, while it is but one of a group of temples it may be taken as a type. Two massive pylons or battered pyramid shaped walls, form the main front the entrance door being between them. Entering there is an outer court then a colonnaded inner court, from which the Hypostyle Hall is approached. This hall has a central nave flanked by vast columns its aisles have shorter columns with a clerestory above for lighting the carved and coloured decorations that cover the surfaces these telling in hieroglyphics the history of the kings. The hieroglyphics, countersunk, are so treated that they enrich the walls without destroying their breadth their sinkings carry colour that through ages has been respected by the climate. Beyond the Hypostyle Hall are smaller halls and finally the shrine of the deity is reached surrounded by the chambers of the priests. Outside Karnak an avenue of sphinxes leads for two miles to the temples of Luxor. These great Theban works extend from the 19th to the 12th century B.C.

Tombs of Egyptian Kings

Across the Nile and opposite Luxor are more Rameses temples, the colossal Memnons and the tombs of the kings. The last are descending passages cut in the limestone leaving a smooth face for the biographer to tell his story in hieroglyphics. The temples through thousands of years adhered to the same general plan and it is interesting to find Romans during their occupation building temples on the Nile with all the semblance of Egyptian work. The temples of ancient Chaldaea were towers rising in steps or stages, and such was the tower of Babel. Assyrian temples also were of this type. The Phoenicians were temple builders, and probably helped in the building and decoration of Solomon's great temple about 1000 B.C.

INDIA The Aryan race, worshipping out of doors, had no priesthood or temple. Two centuries B.C., however, the Buddhist religion was formulated and became a state religion and various toposes were set up. These were monolith pillars, they also took the form of mounds or tumuli, stone covered and forming a solid dome with a chamber for the sacred relic contained therein. There are rock cut temples of antiquity, also rock cut monasteries for the multitude of priests who

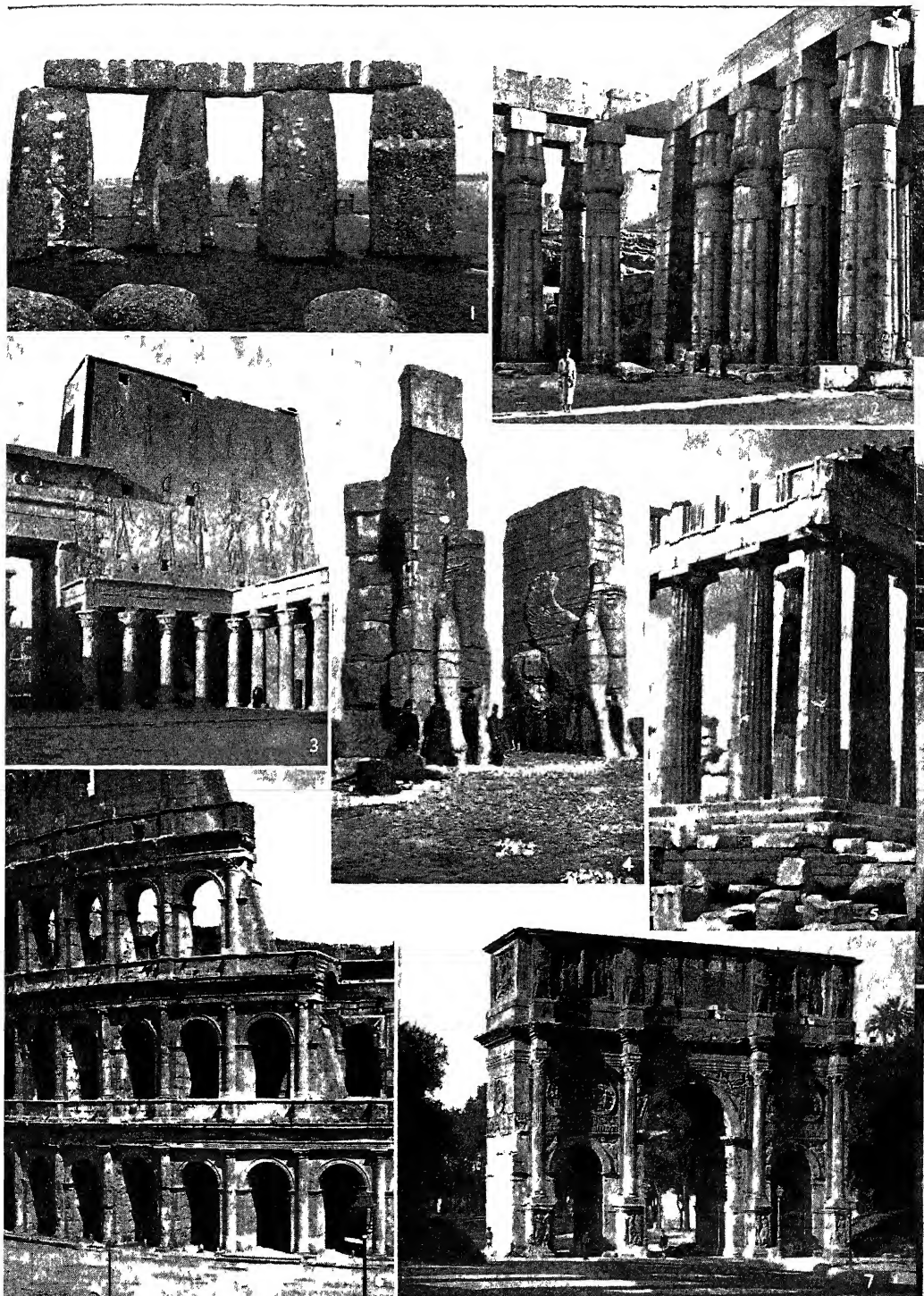
formed a large percentage of the people. Later there are the Buddhist temples covered with sculpture even on the surface of the cone shaped domes these carvings projecting and breaking the outline of the building. Here are the Jain temples with simpler and cleaner lines their stone posts cantilevers and lintels showing a derivation from wood construction. The sacred tanks with their ghats and stairs for the bathers are of interest and beauty, as also are the canals and marble pools laid out around the temples and palaces.

Ideal Indian Architecture

The Mahomedan mosques have more of restraint and simplicity of line than the earlier temples though both were the work of Hindu hands. The arcades of pointed arches bear some resemblance to the Gothic work of the same period, though the Indian pointed and ogee arch is Persian in origin. The construction of the dome was skilfully developed in India, where ties take the strain internally instead of massive buttresses outside.

The famed Taj Mahal a mortuary raised over a favourite wife is perhaps the most complete example of ideal Indian architecture. Round the central dome are four smaller domes and beyond these are the minarets, gardens, cypresses, fountains, and marble canals enclosed by an arcaded wall with its gateways on four sides. The interior is rich in inlay or pietra dura with precious stones. Externally the beauty of the composition with the tenderness of colour have made this monument famous. It has been said that an Italian assisted in this work, but in all respects it follows Indian tradition. The great walled cities, forts and palaces impress one by their magnitude, as do the buildings piled together above the ghâts of Benares, but in India generally the beauty of detail has absorbed the force of the designer and craftsman.

GREECE Of all the early civilizations the most refined and most magnificent was that of Greece which reached its zenith in the golden age of Pericles. The Greek temple was a shrine providing shelter for the image of the particular deity rather than a place of assembly for worship. It was a house set on a high base and generally on a hill, and was either rectangular or circular in plan. The Greek temple had its colonnade

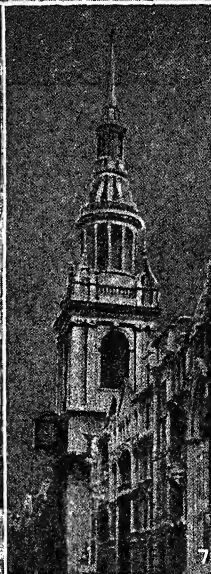
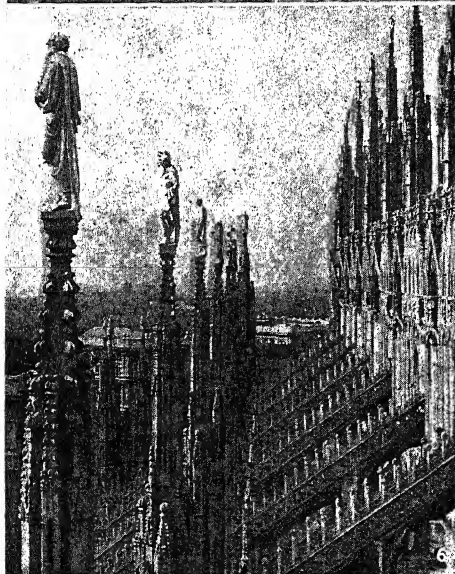
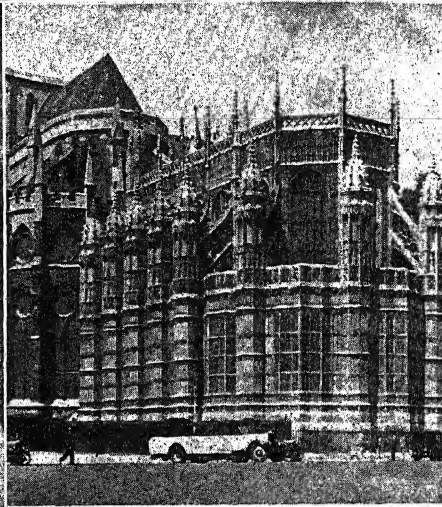
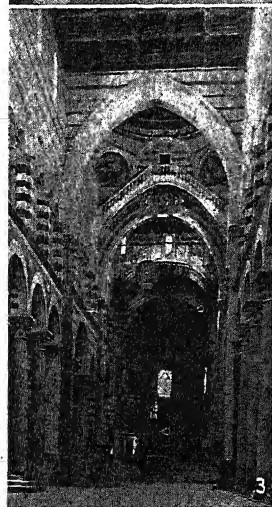
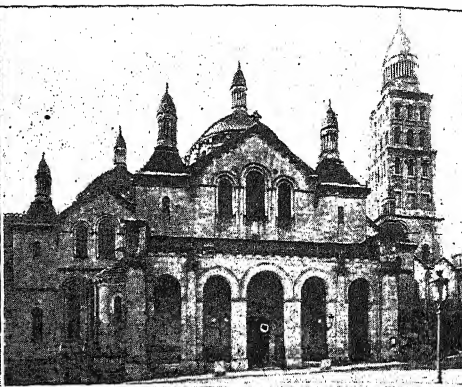
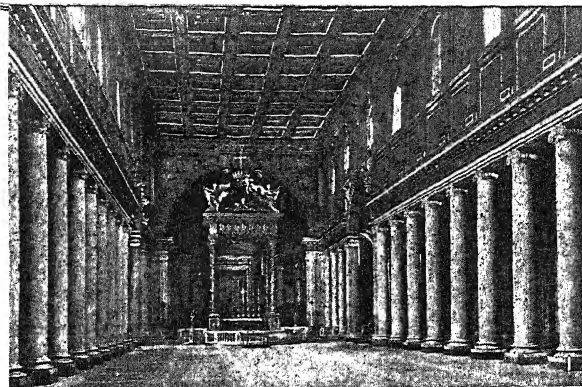


1 Stonehenge Neolithic monument 2 Colonnade and pylon of the Temple of Luxor Egypt (c 1390 B.C.) 3 Massive monolithic pylon at the Temple of Edfu Egypt (c 7-57 B.C.) 4 Eastern portal of the propylaea at Persepolis Ancient Persia (c 460 B.C.) 5 Corner of the Parthenon

Athens showing Doric columns and entablature (447-432 B.C.) 6 Three storeys of the Colosseum Rome showing Tuscan Doric Ionic and Corinthian orders (begun A.D. 72) 7 Triumphal Arch of Constantine Rome lavishly sculptured in Corinthian style (greater part 2nd cent. A.D.)

ARCHITECTURE OUTSTANDING EXAMPLES OF ANCIENT AND CLASSIC BUILDINGS

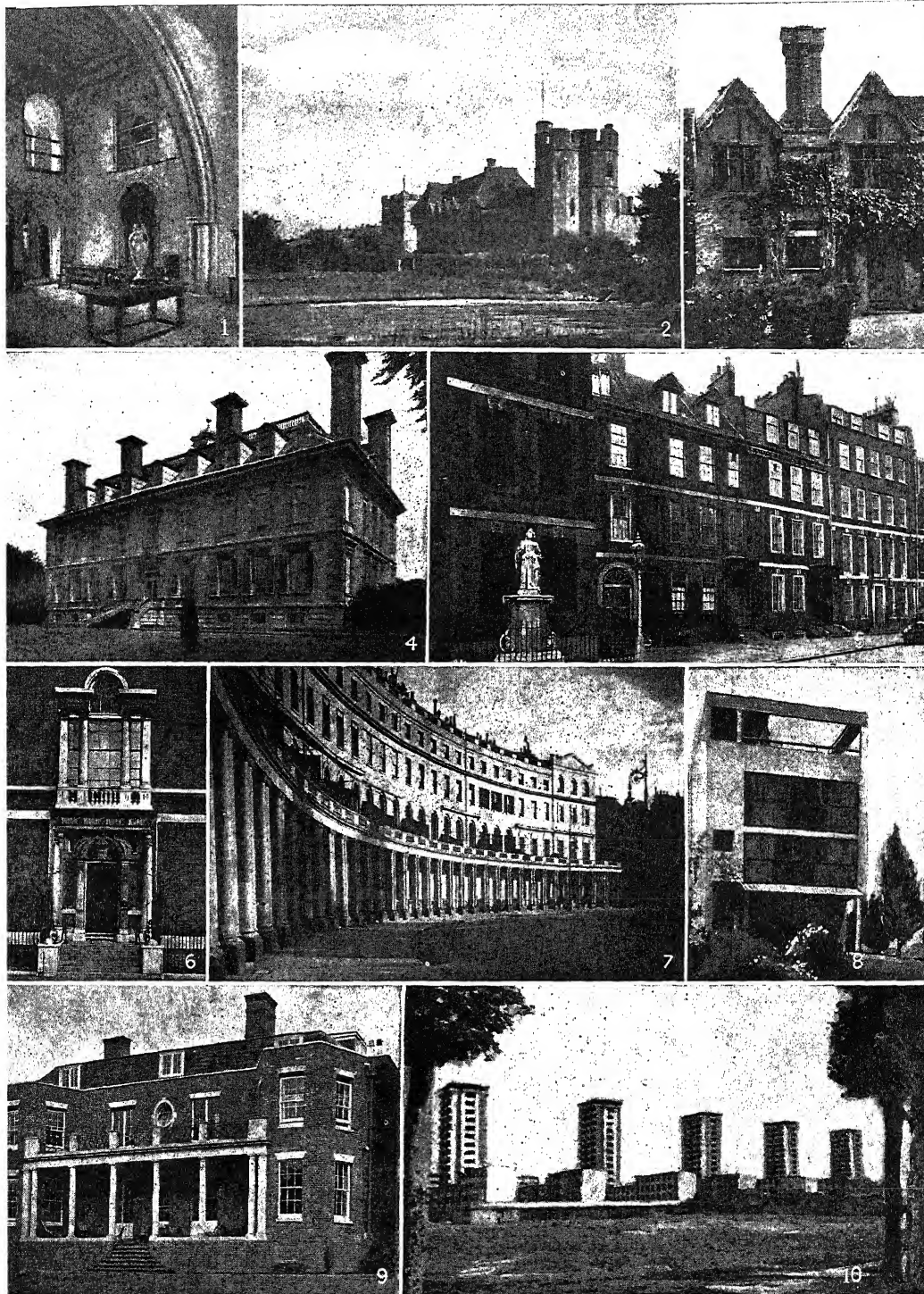
Photos 1 and 3 Donald McLeish 2 late Sir W. Flinders Petrie 4 L.N.A. 5 7 W.F. Mansell



1. Church of S. Maria Maggiore, Rome, early Christian basilica. 2. Périgueux Cathedral, example of Byzantine architecture, cruciform in plan and roofed with five stone domes. 3. Pisa Cathedral, Italian Romanesque. 4. N. door of the Gothic church of S. Wulfram, Grantham. 5. Henry VII's Chapel, Westminster Abbey, late Perpendicular. 6. Flying buttresses and pinnacles of Milan Cathedral, consecrated in 1577. 7. Steeple of S. Mary-le-Bow, one of Wren's London churches. 8. S. Marienkirche, Mülheim, example of modern ecclesiastical architecture

ARCHITECTURE: ECCLESIASTICAL STYLES OVER A PERIOD OF NEARLY 1500 YEARS

Photos. 1, W. F. Mansell; 2 and 3, E.N.A.: 4 and 5, Wul F. Taylor; 6, Donald McLeish

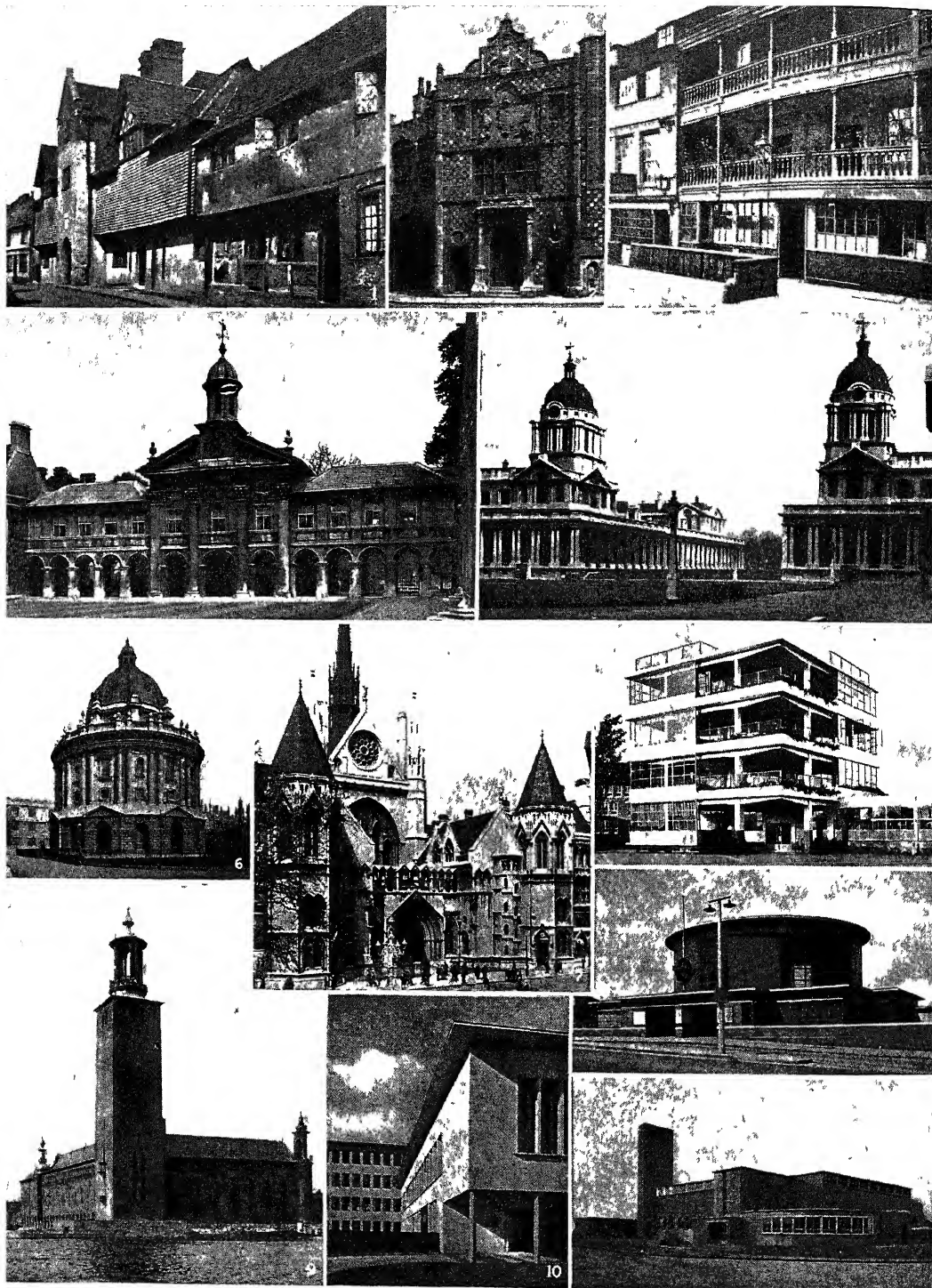


1. Interior of the Norman keep at Hedingham Castle, Essex. 2. Stokesay Castle, Shropshire, 13th cent. fortified manor house. 3. Side entrance to Dorney Court, near Windsor, example of Tudor domestic architecture. 4. Coleshill, Berks, 17th cent. country house. 5. Queen Anne's

Gate, London; early 18th cent. 6. Façade of Gwydyr House, Whitehall, built in 1796. 7. Park Crescent, Portland Place, part of Nash's architectural scheme. 8. House at Stuttgart by Le Corbusier. 9. Modern Georgian house by W. J. Palmer Jones. 10. Blocks of working-class flats near Paris

ARCHITECTURE: HOUSING DEVELOPMENT FROM PRIVATE FORTRESS TO MODERN FLAT

Photos, 1, F. Bond; 2, Herbert Felton; 3 and 6, Humphrey Joel; 4, "Country Life"; 5, Langlier; 7, Will F. Taylor; 8, Fredk. Etchells; 9, courtesy of "The Architect"; 10, courtesy of Matthew Nathan



1. Fifteenth century grammar school, Steyning, Sussex. 2. Tudor Guildhall, King's Lynn, Norfolk. 3. George Inn, Southwark (16th cent.); the galleries date from about 1676. 4. Wren's cloisters and chapel at Emmanuel College, Cambridge. 5. Greenwich Hospital, originally designed by Inigo Jones and John Webb and finished by Wren. 6. Radcliffe Library, Oxford, probably the finest work of James Gibbs. 7. Royal Courts of Justice, Strand, built 1874-82. 8. Modern school at Amsterdam. 9. The Town Hall at Stockholm. 10. Factory at Welwyn, Herts. 11. Arnos Grove Underground Station (one of London Transport's modern designs). 12. Pithead baths at Lea Green Colliery, Lancs.

ARCHITECTURE: SOME PUBLIC AND COMMERCIAL BUILDINGS OF FIVE CENTURIES

Photos, 1, Dixon Scott; 2, Will F. Taylor, 3, "Country Life". 4, 5, 7, and 9, Donald McLeish, 6, Newton & Co., 8, Netherlands Govt., 11, London Passenger Transport Board

all round its walls, while the Egyptian temple had walls outside its colonnades. The student has been taught to look to the Greeks for the beginnings of architectural inspiration. Through a period of about six hundred years their great works evince the intellectual power and perception of beauty of the Greek architects and sculptors.

This chapter of history begins with the Doric order, but we must not look on the Greek as the originator of the column and lintel. Long before his day the Assyrians on one side and the Egyptians on the other had erected monuments from whose columns, lintels, and cornices the massive Doric drew its inspiration; beginning with sturdy shafts three and a half diameters in height, coming by degrees to the later refinements.

Ionic and Corinthian Orders

The volutes that distinguish the Ionic order are as assuredly traceable to an Asiatic origin, but the developments of the styles as culminating in the Parthenon and in the Erechtheum are the result of study and calculation on the part of a people to whom art was the soul of existence. The Corinthian order is a later and more elaborate composition comparatively little employed in the great days of Greece; it was in more general use in Rome.

In a Greek structure laws minutely defined the exact size of its mouldings and parts, with fine calculations for the entasis or gentle curve in the profile of its columns; a delicate and hardly perceptible bow in the line of the steps; also the depth and number of its flutes. In addition to this study of form, the whole was subjected to colour. The overlaying with precious metals, together with the painting of sculpture, does not accord with northern ideas, but it met Greek needs.

ROME. The Etruscans, an Asiatic and nomadic race, migrated through Greece to Umbria, where they settled and built cities. They were imbued with the Greek feeling, and they and their art spread through Italy. Their primitive work is recognized by the great stones they used in walls built with mortar. Few of their works remain, but they had a wide influence in the country of their adoption. The temple of Jupiter Capitolinus in Rome was Etruscan. The Romans borrowed the Doric and Ionic orders from the Greeks, making their own version of the same, while the richer features of the Corinthian were more in favour. The Composite order, a mixture of the Ionic and the Corinthian, was much

in vogue. Arched construction was found capable of many forms that columns and lintels had not attained to, and it is the method generally employed by the Romans.

The Romans built temples to many gods, but the monuments of ancient Rome are of diverse kinds. There are the defensive walls and city gates, the aqueducts, tombs, triumphal arches, and the baths, which were on a sumptuous scale. In those of Diocletian and of Caracalla can be traced the magnitude of these vast institutions, with their thermal schemes, their great halls, vaulted roofs, and painted walls, together with gymnasias, stadia, and courts for wrestling.

The foremost feature of ancient Rome is the Colosseum, where her citizens made holiday. It is of arched construction, the vast oval being formed by mounting tiers of vaulted corridors, their sloping surfaces carrying stone steps or seats for 60,000 spectators of the gladiatorial and other shows. The outside wall is 150 ft. in height, its three tiers of arches divided by pilasters and cornices of the three orders, applied as surface decoration.

Features of the Pantheon

The Pantheon is a beautiful domed building. The cupola is of brick, in strong cement, not in arches, and was probably built without centring, making the vault a single homogeneous mass or whole as an inverted concrete cup, resting on the walls without thrust. The roof has lost its bronze covering, while Agrippa's fine portico differs in date from the circular temple itself. The lighting by one central eye in the vault has great charm. The triumphal arch was the Roman way of preserving the memory of victories and of victors; the latter were not always artists, and the results are sometimes barbaric, but it is interesting to come upon these memorials of conquest in northern cities as well as in the African desert.

The Romans were a practical people, and before achieving architectural glories Tarquin built the Cloaca Maxima, the finest sewer the world has known; it is formed of three rings of stone arches, and drains the city to the Tiber. The boldest civic undertaking was the conduit of fresh water from the Alban hills by the great arcaded aqueducts, sometimes two storeys in height, that wander over the Campagna. The Pont-du-Gard near Nîmes is, perhaps, as impressive as any of these, though Roman aqueducts in Spain are also on as large a scale. It is customary to contrast

Roman brute force with Greek refinement, giving too little praise to the Roman civilizers of the world; the Roman ideal was noble, and when in a medieval city we come upon a fragment of Roman work, be it only an arch or column, it is bold and masterful beside its more ephemeral later surroundings.

ROMANESQUE. On the fall of Rome and the influx of barbarians there was a period of chaos, lasting until, under the emperors Constantine, Justinian, and Theodosius, Christian churches were built in the manner which grew out of the Roman and is known as Romanesque, coeval with Byzantine.

The Roman basilica, the law court and merchants' exchange rather than the Roman temple, was adopted as the type for the Christian church. The plan of the basilica is a parallelogram divided into three parts longitudinally by two rows of pillars and arches. At one end was the tribune for the judges arranged in a semi-circle. This became the apse of the church.

In Ravenna are famous churches of the 6th century, notably Sant' Apollinare Nuovo, a rectangular building with its arcades and aisles and mosaic walls; and San Vitale, circular and domed, with a two-storeyed aisle. This church was taken by Charlemagne as a model for his Christian church and tomb at Aix-la-Chapelle.

The early churches of Germany were developments of these Romanesque types with their round arches and apses. Externally the grouping of their apses and towers makes a fine composition, though there is sometimes dullness and want of interest in detail; Mainz, Worms, and Grosser S. Martin and S. Gereon at Cologne are examples.

Roman Detail in French Churches

With the Latin races of southern France the Romanesque had a happier growth, often preserving Roman detail in mouldings, caps, and even fluted pilasters. Fragments of old buildings were frequently employed without doing violence. Much fancy is displayed in the arcaded cloisters with their coupled or clustered shafts, while the western portals of early southern churches, as at Saint Gilles, are rich and on a scale that causes disappointment on entering. In some early churches shallow domes are formed in the vaulting of the nave for internal effect, the domes being generally hidden by roofs outside. Such are Angoulême, Loches, and Cahors, also Périgueux, with its five domes.

Beside the influence of Rome was that of the Lombards, a Gothic

race who invaded and colonised northern Italy and inspired the building of the churches of Piacenza, Novara, Pavia, S. Ambrose of Milan, and others. In these the small arcaded corridor, open to the outside, is an interesting feature, as in the German churches, where it has the same Lombard origin. Of Italian churches, San Miniato at Florence, 1013, and Pisa cathedral, half a century later, are Romanesque basilicas with a slight Lombard influence.

Byzantine and Moorish Work

The famous shrine of S. Mark, Venice, is a creation apart. With her fleet and commerce Venice was more in touch with the East than the West, and her cathedral with the five domes and other Oriental features is practically Byzantine. The interior, notwithstanding its wealth of marbles, mosaics, and gathered treasures, has a breadth, restraint, and solemnity perhaps unsurpassed in any other Christian church. As for the Gothic churches of Italy, the manner was an importation from the North, and was never at home in Italy. The western marble façades of Siena and Orvieto have steep gables with nothing behind but their low-pitched roofs, and other northern features are copied without a reason.

BYZANTINE. Of Byzantium, the capital of the Eastern Empire, the great work is Santa Sophia; and one marvels that this early Christian church, with its original scheme and daring construction, should have risen in its completeness while the Western world was emerging from a period of anarchy and darkness.

The Byzantine church is generally a Greek cross in plan. This style, of Roman origin and with eastern characteristics, was for centuries used by the Slavonic races, being the mode of building in Greece, Russia, Syria, and wherever the Greek Church obtained. Its leading feature is the dome in its varied forms, and combinations of domes. It has influenced Asia and has received inspiration from that continent. With the Arab conquests in the 7th century came a check to the development of the style, but it forms the root of Mahomedan work in Egypt, N. Africa, Syria, and Spain.

In Spain the mosque at Cordoba with its thousand pillars, and the palace of the Alhambra at Granada, are typical examples of the Moorish Saracenic; as also is the great Giralda tower at Seville, fine in its proportions and simpler in line than Indian towers of the same date. Some of the mosques may compare not unfavourably with

British Gothic work of the time, in the treatment of masonry and especially in the beautiful working out of the pendentives.

SAXON AND NORMAN. For 400 years the Romans occupied Britain, building many cities and towns with all the amenities to which they had been accustomed. Their mosaic pavements and admirable heating schemes show the character of their English homes. They built themselves palaces, halls, baths, and theatres, and these would have afforded models for the islanders to follow; but Britons and Saxons spent their strength in fighting. When Saxons began to build there were the Roman examples before them, and the ruins as a ready quarry. With this inspiration their work may be styled Romanesque.

In the 7th century, when King Egrith ordered the building of a monastery in Northumbria, the bishop, finding no masons in England, went to Gaul, bringing back artificers in various trades, some stopping to teach the islanders glass-making and other crafts. Saxon towers were square, without buttresses and diminishing in stages, with long and short quoins stones at the angles, also small shaped or turned balusters as shafts in their coupled windows; and although they used the round arch, an opening is frequently covered by two stones inclined to a point. For decoration the walls are often divided into panels by narrow strips of stone, as in Earls Barton church.

Norman Builders in England

Of the small early Saxon churches some have the apse, but the British form, as at Bradford-on-Avon, was the square east end, which has remained the distinguishing feature of English work. Westminster and Canterbury are exceptions, with the chevet and apsidal chapels, but they are by Lanfranc and Guillaume de Sens. The Saxon churches were mostly swept away by the energetic Norman builders, whose numerous great works, churches, abbeys, and castles in England were nearly all accomplished in a period of 50 years. Of these are Rochester, Winchester, Peterborough, Durham, St. Albans, Ely, etc., as well as many great abbeys. At the same time in Normandy the Conqueror was building the Abbaye des Dames and the Abbaye aux Hommes at Caen, and many castles in both lands.

The aisles of the Norman church were usually vaulted, while the wider nave had its wooden ceiling, as at Peterborough and St. Albans; the smaller English church is

generally wood-roofed. In France vaulting was earlier used, and has been the general treatment of roofs in France. The enrichment of Norman work in England is almost entirely with chevron, billet, and dog-tooth forms on the several rings or orders of arches. The small churches of Barfreston, near Dover, and Iffley near Oxford, are good examples.

GOTHIC. In the last quarter of the 12th century came a change in the character of construction. The Normans, with their massive piers and columns, had been prodigal of stone; science demanded economy in the use of material and of space. Lighter piers and shafts were employed, and instead of the round arch the pointed arch was found to give less thrust, the thrust being transferred from the nave to the aisle walls by flying buttresses above the aisle roof.

English Transitional Architecture

At first round arches and pointed arches were used together indiscriminately; this period is known as Transitional. The choir of Canterbury by Guillaume de Sens is of this type. The windows, either single or grouped, were lancet-shaped without tracery; the Five Sisters of York North transept are an illustration. S. Denis, in France, anticipates the English Transitional work. A beautiful and fully developed example of the English pointed is S. Hugh's choir of Lincoln Cathedral, belonging to the end of the 12th century.

Then followed simple tracery in the window, generally a shaft between two lights and a circle above. Salisbury was begun in 1220. It is internally rather dull and cold, in spite of its noble size and proportion. The pillars have detached shafts of Purbeck marble, which became the fashion at that period, sometimes to the detriment of the building.

A perfect achievement of this period is Westminster Abbey. After the destruction of the Confessor's Norman church, the present beautiful structure was begun in 1245 for Henry III, Master Henry being the master mason or architect. He saw the choir and transepts carried out. His successor completed the nave, adhering to Henry's design, appreciating its charm, although it was the mediæval custom to introduce the new characteristics of the day. The proportion, the refinement of mouldings, and the diaper enrichment of the surfaces unite in making the abbey unrivalled even by the greater Continental cathedrals; its narrowness accentuates its apparent height and length. Through the Gothic age there were

recognized architects, laymen, who designed for William of Wykeham and other churchmen.

At this period the cathedrals of the growing cities were enlarged or rebuilt, vying with the great abbey churches of the wealthy monasteries. There was no building of sumptuous houses, and the wealth of the baron was spent in building a shrine where prayers would be offered up for his soul. Gothic went rapidly through its various changes of Early English, Decorated, and Perpendicular.

Decorated and Perpendicular

The Decorated is marked by its rich geometrical and flowing tracery; the Perpendicular by its insistence on vertical lines, including the upright panelling of walls. Vaulted roofs when of stone had elaborate, lace-like fan tracery; when of wood they were hammer-beam roofs, like that of Westminster Hall. There is a stateliness as well as proportion about the buildings of this period, as shown in the churches of Norfolk or of Somerset, and in the chapels of King's College, Cambridge, St. George's, Windsor, Henry VII at Westminster, Bath Abbey, and St. Mary Redcliffe, Bristol. The Perpendicular is strictly English; during its reign the Flamboyante was running its course in France, where works of wonderful play and fancy were produced. The Palais de Justice, Hôtel de Bourgtheroulde, and the central crown of St. Ouen, Rouen, exemplify the Flamboyante style. The Perpendicular continued a little longer in England before it disappeared under Italian influence.

Mention must be made of the noble Gothic churches of France, e.g. at Laon, Soissons, Reims, Bourges, Amiens, Beauvais, and Chartres, and of the Gothic achievements of Spain—her grand cathedrals with their sculptured screens, retables, metal grilles, and splendid tombs. The small amount of space devoted to windows, and those high up, allows a breadth of wall space giving to Spanish Gothic a character quite apart from the northern types. In Spain the early or Romanesque buildings have much Norman character. Saracenic had no great influence during the Gothic period, though sundry Moorish towers were incorporated in medieval buildings, as notably the fine Giralda of Seville. The bridges of Spain, too, are grand architectural works, each with special individuality, and we realize that the

ARCHITECTURE : THE MAIN HISTORIC STYLES AND PERIODS

STYLE, DATE, AND SUBDIVISIONS	PRINCIPAL FEATURES
GREEK 7th century B.C. to 3rd century A.D. <i>Archaic Period, lasting to the 5th century B.C.</i> <i>The Golden Age, 5th to 4th centuries B.C.</i> <i>Hellenistic Period, 4th century B.C. to 4th century A.D.</i>	Principal material: Wood, clay, stucco, and stone. The basis of Greek architecture was lintel and post construction, the use of the arch being practically unknown. The column and capital were of three kinds, known as the order: Doric, Ionic, and Corinthian. The last was developed, to the exclusion of the others, during the later (Hellenistic) period. The greatest period of Greek architecture was the 5th century B.C., during which the Parthenon was built.
ROMAN 2nd century B.C. to 4th century A.D.	Roman architecture took from the Greeks their three orders: Doric, Ionic, and Corinthian, and added a fourth ("Composite") order of its own. From the Etruscans it borrowed the arch and vault, and these were developed into the outstanding feature of the Roman style. Massiveness and solidity were characteristic of their buildings, which consisted of temples, baths, aqueducts, theatres, etc. The finest monuments, e.g. the Pantheon and Colosseum, were erected during the Imperial regime. Traces of public buildings and villas may be found wherever the Roman power penetrated.
BYZANTINE 4th to 12th centuries. <i>Neo-Byzantine, 8th to 12th centuries.</i>	The great feature of Byzantine building is the dome, more particularly the dome fitted on to square or octagonal apartments, by means of pendentives. By means of the "cushion" capital, they were also the first builders to "spring" the arch direct from the summit of the column without the employment of an intervening entablature. Brick is the principal material in Byzantine building. The most notable monument of the style is the cathedral of St. Sophia at Istanbul (Byzantium), completed A.D. 537. St. Mark's, Venice, is a typical example of Italian 11th century Byzantine.
ROMANESQUE 9th to 13th centuries. <i>Norman, 11th to 13th centuries.</i>	Romanesque is really the continuation in the North and West of Europe of the Byzantine style, and its development was largely in response to the needs of religious ritual. The cushion capital and the barrel vault are both characteristic of Romanesque, as of Byzantine, and similarly the apse (see illus. p. 581) is a prominent feature of the Romanesque church. Examples: Pisa Cathedral; S. Zeno Maggiore, Verona; S. Trophime, Arles; S. John's Chapel, Tower of London.
GOTHIC 11th to 15th centuries. <i>French Gothic.</i> <i>German Gothic.</i> <i>English Gothic:</i> (1) <i>Early English</i> (13th century), (2) <i>Decorated</i> (14th century), (3) <i>Perpendicular</i> (15th century). <i>Italian Gothic.</i>	The distinguishing feature is the pointed arch, as opposed to the round arch. Windows are filled with Tracery work, the massive piers of Norman architecture give place to clusters of columns, and capitals are rounded. Verticality is the principle underlying Gothic architecture, and the walls and towers of Gothic cathedrals rise to a great height, the buttress often being employed as a support. Siena Cathedral is a fine example of Italian Gothic, and in France, Chartres Cathedral (late 12th century) represents the style at its most magnificent. In English Gothic, the extensive use of ornament was developed during the Decorated and Perpendicular periods. Examples are to be found in the great cathedrals, abbeys, and churches such as Canterbury, York, Durham, Salisbury, Westminster Abbey, etc., as well as many beautiful old parish churches.
RENAISSANCE 15th to 18th centuries. <i>Italian Renaissance.</i> <i>French Renaissance</i> (Neo-Classic). <i>English Renaissance:</i> (1) <i>Tudor</i> (16th century), (2) <i>Jacobean</i> (17th century), (3) <i>Georgian</i> (18th century).	A reversion to the classic principles, modified by the general humanistic influences of the time. Fine planning, proportion, and scale were aimed at, and ornament selected with discrimination. Wren drew his inspiration for his Renaissance masterpiece, St. Paul's Cathedral, London, from S. Peter's, Rome. In English Renaissance a combination of brick and stone was used, e.g. at Hampton Court. A monumental instance of English Renaissance style applied to domestic building is Vanbrugh's grandiose Blenheim Palace.
ORIENTAL 6th century B.C. to 18th century A.D. <i>Mahomedan Architecture, 7th to 17th centuries A.D. (Syria, Mesopotamia, Persia, Asia Minor, North Africa, Sicily, Spain, Turkey, India).</i> <i>Buddhist Architecture, 6th century B.C. to 7th century A.D. (India).</i>	Assumed a great number of local characteristics, differing according to diversities of climate and material. The cupola, horseshoe arch, and minaret are outstanding features. Construction is mainly light and flimsy compared with Western architecture. Ornamentation is generally very rich and, particularly as regards Indian varieties, fantastic. Colour is freely employed. Good examples are innumerable: but the rich ornamentation characteristic of the Moorish style is probably seen at its best in the Alhambra, Granada; while the beautiful proportions and symmetry of the Taj Mahal, near Agra, reveal the underlying kinship of all great design, in whatever style it may be expressed.



Architecture. S. Peter's, Rome, culmination of Italian Renaissance architecture; dome by Michelangelo, colonnade by Bernini

cities of Spain were built by artists with a great ideal. A nation's perception of art, or indifference to art, may be measured by the bridges that it throws across its streams.

Although churches have been taken to exemplify the styles of medieval architecture, all other buildings were constructed in the prevailing style of the period. The cities of Flanders, the Hansa towns, and the Lombard cities would build their warehouses, halls of the guilds, and merchants' houses in the manner of the day. The style was not essentially an ecclesiastical style; it was adapted in every case to the special needs, e.g. the mulioned windows that fill the width of frontage of each house in an Antwerp street, as well as the timber house fronts of Exeter.

RENAISSANCE. After the eclipse of Imperial Rome, the Romanesque, Lombard, and Gothic prevailed for about a thousand years. Then came new life into literature with Petrarch as chief agent. An age of research and of the discovery of the long-unheeded treasures of the neglected past began, and by the infusion of classic feeling during the 14th and 15th centuries new vigour was given to the designer and artificer. Michelozzo and Brunelleschi and their follower Alberti initiated a new development in architecture which produced palaces and churches in Rome, Florence, and other parts of Italy, each stamped with the individuality of the master's hand, until the period culminated with Michelangelo in the cathedral of S. Peter at Rome.

In France the Italian revival made a strong impression. Under

neys, and other details, while there was often an indifference to the composition or design of the whole; the result had some resemblance to the Jacobean, but the French sculpture was of a higher order. In the Louvre the style is found developing under the hands of Lemercier, de l'Orme, du Cerceau. Jean Goujon, and Mansart, with whom French Renaissance and the employment of the orders became the mode for those who built; and with various modifications it obtains in France today. Distinct phases follow one another rapidly at the hands of these eager artists and their royal patrons. We can distinguish in the work of Louis XII, Francis I, Henry II, and Henry IV, and of the succeeding Louis XIV, XV, and XVI, marked characteristics attaching to each reign, especially in internal decoration and furniture

Baroque and Rococo

The style known as Baroque was a further neo-classical development, which spread from Rome, where it culminated in the work of Bernini (1598-1680) and Borromini (1599-1657), to Austria, Germany, France, and Spain. Evident in this style was a high sense of the dramatic and a love of ornate detail. Though pompous in effect, it was, at its best, always vigorous, giving an illusion of harmonious movement. In Spain it was carried to excess, particularly in the work of José Churriguera (1650-1725). A late development of the Baroque style of decoration was the Rococo, popular in the first half of the 18th century. Opulent designs reached the height of capriciousness, pat-

terns being lavishly embellished with fantastic and irrelevant detail. The Zwinger palace at Dresden (1711-22) is the finest example of the style.

Baroque found few adherents in England. The nearest approach was seen in the development of the Palladian style during the early part of the 18th century, and in the plaster decorations of wall panels and ceilings in country houses of the same period. An unsuccessful attempt to introduce Baroque motifs in the façades and interior decoration of certain London buildings was made in the opening years of the 20th century.

Renaissance in England

After the great fire of London in 1666 there was by good fortune an architect with exceptional powers to re-scheme the city and rebuild its cathedral and its fifty churches. Sir Christopher Wren, while using elements of Roman origin, developed a treatment distinctly his own, which became the English mode of building for the following 150 years. Among Wren's monuments are S. Paul's Cathedral, Greenwich Hospital, Chelsea Hospital, his half of Hampton Court Palace, and his City churches with their varied forms and plans, and with their specially English feature of classic steeples in successive stages or orders, as in Bow Church, and S. Bride's, Fleet Street.

A great Renaissance architect was Inigo Jones, who travelled to Italy and became imbued with the spirit of the new birth. Among his works are the Queen's House, Greenwich and Ashburnham House.

Sir John Vanbrugh designed Blenheim and Castle Howard, houses on a grand scale; Hawksshaw, the pupil of Wren, James Gibbs, Colin Campbell, Sir William Chambers, William Kent, and others continued the classical tradition, as did the brothers Adam (*q.v.*). Gandon and others who built the Custom House, Parliament Houses, Four Courts, and other important public works and houses in Dublin, demonstrate the accomplishment of fine design in that city. So also the city of Bath bears witness to the skill of the Woods, father and son, and other 18th century architects.

With the end of the 18th century the revival of classic forms had spent itself. Greek, Roman, and Italian styles remained the dominating influence in the early part of the 19th century, but only occasionally was the convention adapted with a flash of inventive genius, as in the stucco Regency

houses and terraces of John Nash, and the neo-Greek of S. George's Hall, Liverpool, Smirke's British Museum, and Sir John Soane's Bank of England, the last being a good practical application of Greek treatment. The architecture of the 19th century in Great Britain was chiefly notable for the results of the Gothic revival. In the battle of the styles, argued through several decades, the Gothic finally triumphed. Examples of neo-Gothic, sometimes called Victorian Gothic, are evident all over the country, and not only in the many new churches that were built to meet the needs of the swelling urban populations. Welby Pugin (1812-1852) was the leader of the revival. He built over sixty new churches in the Gothic style, including Southwark Cathedral. Other notable churches of the same period and style include S. Mary's Cathedral, Edinburgh; S. Mary Abbots, Kensington; S. Giles, Camberwell; Truro Cathedral. But of secular buildings the Houses of Parliament, the Law Courts, Birmingham Grammar School, and the town halls of Manchester and Bradford were among many buildings which showed that the style was by no means to be confined to ecclesiastical work. Even rly. stations,

e.g. S. Pancras, London, and Temple Meads, Bristol, were brought within its orbit. Besides Pugin, the chief names associated with the movement were those of Sir Charles Barry, George Edmund Street, J. L. Pearson, Sir Gilbert Scott, and (later) Sir Giles Gilbert Scott, whose Liverpool Cathedral begun in 1903 may be considered the consummation of the movement.

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ARCHITECTURE: THE MODERN VIEW

Clough Williams-Ellis, F.R.I.B.A.

Here the history of architecture is continued to include its development, often along new lines and with new materials, through the first half of the 20th century. and the modern architect's approach to his problems is defined

Obviously every phase of architectural development, from the time of the Pyramids down to that displayed in a contemporary atomic-bomb laboratory, is "modern" within its own period and in so far as it is authentically evolutionary and not a deliberate throwback to some past convention.

After a century and more of dressing-up in the cast-off architectural finery of almost every past age and almost any clime and country, the world seems to have become a little tired of the masquerade, to see that there is perhaps something a little absurd in trying to pack and squeeze our new and strange requirements into old containers designed for entirely different purposes and other ways of living.

The old forms may be beautiful and have great historical and sentimental prestige, and it may well and justly please us sometimes still to express ourselves in a by-gone manner of speech on special

occasions or for particular good reasons, when, for instance, it might seem ill-mannered to put a group of old buildings out of countenance, by arbitrarily introducing a quite new, alien, and inharmonious convention beside them.

Yet because architecture is evolutionary, and because the pleasure a building can give to an instructed beholder seems to depend on certain principles that are basic to designing in whatever style, there can be just as much difference in the artistry and quality displayed by perfectly plain, straightforward modern buildings as between a collection, say, of Venetian palaces or medieval cathedrals.

There may not be a single inch of moulding or enrichment or decoration of any sort on buildings by such leaders of the modern school as, say, Maxwell Fry the Englishman, Frank Lloyd Wright the Welsh American, Le Corbusier the French Swiss, Dudok the

Dutchman, or Gropius the ex-German—yet the work of each is immediately recognizable as characteristic of the individual approach of each to the solution of similar problems in design, that approach being in every case "modern" or "functionalist." This largely utilitarian attitude has, like all other cults, been brought into some contempt by its too wholehearted partisans who insisted that efficiency was all, and that to be completely "useful" was to be completely beautiful. This may be true of machines and tools and things that exist only to be used, but not for buildings (except possibly certain factories) because, unlike most machines and engineering works, there are generally many ways in which a building can be designed, all of them perhaps equally good from the single point of view of use. Yet the difference between the several designs as "architecture" may be immense, ranging from the completely banal to the really inspired. That is because the architect usually has far more individual choice than has the engineer.

Window Design and Arrangement

For example, in the English climate, for reasonable light and ventilation, the windows of ordinary rooms are generally about one-tenth of the floor area, that indeed being the minimum required by our building by-laws.

Accepting that convention, the architect can still arrange his required window spaces or "voids" in an almost endless variety of shapes and positions in relation to his "solids" (the walls), thereby determining the pattern, proportion, rhythm, and so on of his building, both within and without.

Granted that the allowance is sufficient and the positions suitable for all practical needs, the architect may distribute his window ration at will to achieve whatever general effect he may deem most fitting to the particular work and its setting. Through this one choice of arranging his openings he has the power to give purposive character to the simplest building, and it is precisely on such broad basic manipulations, and not on detailed ornament, that the modern designer depends for his effects.

He can, if he has the skill, get striking and sometimes really beautiful effects by the simplest and most economical means, by slight changes in proportion, projection, texture, or colour, or by grouping his windows instead of

setting them out regularly, by making his building only "balance" or exactly repeat on either side of its axis. Or, again, by giving prominence and importance to this or that selected feature, perhaps a doorway, a roof, or a chimney, by a mere change in scale or colour, or possibly by some rare splash of ornament sufficient to arouse special interest and to focus attention on that which is thus exceptionally distinguished.

But thus far, modern architecture has been puritanically ascetic in obvious and healthy, if sometimes excessive, reaction to the long overdosing with trite and perfunctory ornament from which building has suffered.

As we get clear of the Edwardian hang-over, our appetite is likely to become once more robust, and we may well regard our recent performances as rather too antiseptic and anaemic to take a very high place in the never-ending pageant of building.

But it will always deserve respect for its honesty of aim, its reforming zeal, and its purging away of vast accumulations of lumber from the past that had too long and too insistently distracted the architect from fresh and purposeful *designing*.

The worst enemies of architectural modernism are the inevitable charlatans and hangers-on who, having picked up a few easy, superficial, and perhaps once fashionable tricks, splash these about on shops, cafés, and cinemas that may be smart enough to delude an ignorant if enterprising tradesman but have no single quality of real architecture or design about them—ancient or modern.

Influence of Crystal Palace

For the origin of modern architecture it is now usual to go back to the old Crystal Palace that housed the 1851 exhibition in Hyde Park and was later removed and re-erected on Sydenham Hill.

Certainly it was a portent, not merely because it so notably exploited new materials and a new technique—iron and glass, with standardised, mass-produced, prefabricated parts—but because, whereas the walls and columns of London's next largest building, St. Paul's Cathedral, take up no less than $\frac{1}{4}$ th of its total floor space, those of Paxton's great palace took up only $\frac{1}{2000}$ th. Revolutionary as it was in the technics of building, its immediate influence on modern architecture was, and long remained, negligible, though the railway engineers

exploited the possibilities it had revealed in the building of some of their larger stations.

Though new materials and techniques can and do modify designs assuredly they should, there is also *fashion*, which can be and often is quite capricious, and it was really fashion rather than logic or the compulsion of use that first set architects thinking in the late 1850s along the new lines that we still call modern.

The Red House, built by Philip Webb for William Morris at Bexley Heath in 1859, is commonly cited as the first faint herald of the far-off dawn, in that it dared to omit a number of outworn conventions, though in many ways it seemed to look back to the middle ages rather than forward to a new one.

Simplicity and Honesty

Other architects of some eminence wavered unstably between past and future until Lethaby, Voysey, Ashbee, Gimson, Baillie Scott, Walton, and Mackintosh really did seem to give us something fresh and new, though chiefly by cutting out all the meaningless claptrap that still passed current for architecture at the time and, as it were, saying what they had to say in a plain straightforward way.

Simplicity and honest good craftsmanship are what distinguish their work from the general ruck of their time, the most significant single building of that period being Mackintosh's Glasgow School of Art, completed in 1909, though its tremendous lessons were better learnt on the Continent and in America than they were in England.

In a way, Lloyd Wright and others began where Great Britain temporarily left off, and from them derived in turn Dudok and Gropius and a number of Austrian and Scandinavian architects, from whom again Great Britain later received back the torch she had originally lit, flaming ever more brightly until the universal black-out of the Second Great War made an end of all but stark utility building. From that austerity we can emerge only slowly, and what effect the harsh discipline may have had cannot yet be judged.

During her early and most difficult reconstruction years after her 1917 revolution, Russia built immensely, badly, and to the most austere designs of Le Corbusier, May, and other foreign architects of the extreme ascetic school.

The Russians of that period were what might be called Mechanically Romantic, and if a building

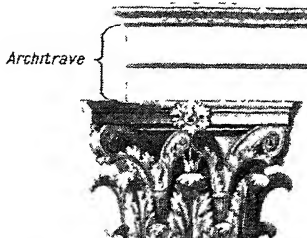
could somehow be made to look like some great machine, so much the better. When, later on, before the Second Great War, they had acquired skill and wealth and power, they proceeded to demonstrate their "arrival" by the elaborate opulence of their buildings with all the naïve ostentation of a *nouveau riche*.

It was human and understandable, but it was not altogether good for the cause of real architecture, modern or other. America, too, has suffered somewhat from the false standards set up by competitive "prestige building," though some of her domestic country building has been a model of simple elegance. Holland has steadfastly remained *par excellence* the country of fine brick building, and the town of Hilversum, particularly, shows to what effective new use this ancient material can still be put.

In the short time between the Gothenburg exhibition of 1923 and that of Stockholm a few years later, Sweden swung right over from her admired and most elegant version of free classic to full-blown functionalism, with, of course, a later swing back again. There has probably been a higher proportion of architecturally distinguished buildings put up in Sweden during the 20th century than anywhere else in the world. If Great Britain is to follow an architectural example and not to set one, she could assuredly do worse than look to Stockholm.

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Architrave (Gr. *archi-*, chief; Latin *trabs*, beam). A term in classical architecture, signifying



Architrave. In classical architecture, the stone beam above a column, carrying the frieze

a member of the entablature, i.e. the stone beam carried by the capital of the column and supporting the frieze above it. The architrave is essentially a feature of lintel and post construction, and disappears with the rest of the entablature from the matured styles of arch construction wherein the arch springs direct from the capital. In modern use an architrave is a plain or moulded strip, around a door or window opening, which covers the joint between plaster and woodwork.

Archivolt (Gr. *archi-*, chief; Ital. *volto*, vault, arch). In Roman and mediæval architecture, a term applied to an architrave which is carried round a curved opening. The archivolt's development follows that of the round



Archivolt, or architrave carried round a curved opening

arch, and in Romanesque, Italian, Gothic, and Mahomedan architecture great attention was paid to the decoration of this member with carved or plain mouldings and contrasted colours.

Archon (Gr., ruler). Name of the chief magistrate in towns of ancient Greece, especially of the nine chief magistrates of Athens. When the kingship was abolished, one archon was appointed for life, the term being subsequently limited to ten years and finally to one, when a board of nine was instituted (683 B.C.). The manner of their election varied from time to time—by the Areopagus, by the ecclesia, by lot. As the powers

of the democracy increased, their functions became mainly judicial and religious. The chief officer was called simply archon: the title *eponymos*, often attached to him, does not mean that the year of his office was named after him, but that his name headed all the official lists and documents. He exercised jurisdiction in matters affecting family rights and guardianship, and arranged the feasts of Thargelia and Greater Dionysia.

The archon Basileus (king), who succeeded to the priestly functions of the kings, supervised the Eleusinian mysteries and various sacrificial rites, and, generally, everything connected with the state religion. The archon Polemarchos (war-chief) was originally head of the war-office, but his functions were subsequently restricted, chiefly to arrangements in connexion with the burial of fallen warriors and the status of foreigners and resident aliens. The remaining six archons, called Thesmothetæ (law-givers), saw that the law was properly administered. Even after Greece had lost her political independence the office was highly esteemed, and Roman emperors did not disdain to hold it. It disappeared in the time of Theodosius II (402-450).

Archpriest or **ARCHIPRESBYTER** (Gr. *archi-*, chief; *presbyteros*, elder). Title given in the 4th century to the principal, usually the senior, priest of a diocese. In a cathedral he acted as the bishop's representative; in rural districts his relations to the local clergy were the same as those of a cathedral archpriest to the other cathedral clergy. In time the cathedral archpriest became the dean, the rural archpriest the rural dean. Their privileges were often usurped by laymen. In England, between 1598 and 1623, archpriests appointed by the pope had jurisdiction over the Roman Catholic clergy; in 1623 they were superseded by a vicar-apostolic. See Aaron; Church.

Arçis-sur-Aube. A town of France. It stands on the Aube, in the department of that name, 16 m. N.N.E. of Troyes. Of its old buildings a 15th century church and an 18th century château remain. Danton was born here, Oct. 26, 1759, and in the neighbourhood, on March 20-21, 1814, Napoleon was defeated by the allied forces, who were thus enabled to march on Paris.

Arc Lamp. Lamp in which the source of light is a luminous electric arc. Before the manufacture of incandescent filament

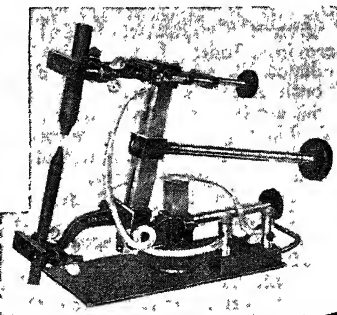
lamps of high candle power, arc lamps were extensively used for street lighting, etc. Present uses are for searchlights, cinema projectors, and lamps for treatment of disease. See Lighting, Electric.

Arcola. BATTLE OF. Fought between the French under Napoleon and the Austrians under Alvinczy, Nov. 15-17, 1796. Arcola is a village on the Alpone, a tributary of the Adige, about 16 m. E.S.E. of Verona.

To relieve Mantua, then besieged by the French, a new Austrian army, about 29,000 strong, under Alvinczy, was sent into Italy. It was to unite at Verona with another army of 18,000 men, then in Tirol. Napoleon had about 43,000, but some were stationed under Vaubois to check the advance, others had to invest Mantua, and only about 18,000 were available for any new movement. On Nov. 14 Napoleon, despondent and fearing the loss of Italy, decided to stake all on an attack on Alvinczy's army before it united with the other Austrians. He crossed the Adige to work round their rear, and threw his forces upon them. Two days passed in indecisive encounters, but in a new attack on the 17th around Arcola there was some stubborn fighting. At first the Austrians had the advantage, but two of the French divisions came up, and drove the defenders from the bridge across the Alpone and out of Arcola. As the fighting was now on drier ground, and the troops were able to spread out, the Austrians, slowly giving ground, fell back to San Bonifacio. They were defeated, but not decisively.

Arcona. CAPE. The northernmost point of the island of Rügen in the Baltic Sea.

Arcos de la Frontera. Town of Spain, in Cadiz province. It is on the Guadalete, 19 m. N.E. of Jerez. Situated on a rocky bluff, and occupying the site of an



Arc Lamp. Carbon lamp used in a cinema projector



Arcola Battle. The fight at the Bridge, Nov. 17, 1798, when, amidst a hail of bullets, Napoleon snatched a standard and, leading his men in a furious charge, shattered the Austrian defence

From an old lithograph

Iberian settlement, it was a Roman colony, and took a prominent part in the struggle against the Moors. It has a Gothic church, a ruined citadel, and remains of the palace of the dukes of Arcos. The rock is pierced by numerous ancient cave-dwellings. Pop. 16,000.

Arcos Raid. Police action taken May 12-15, 1927, against the firm of Arcos, Ltd., agents for trade with the U.S.S.R., at their offices in Soviet House, Moorgate, London. The raid was made by Scotland Yard on the orders of the Home Secretary, Sir W. Joynson-Hicks, later Lord Brentford (*q.v.*), ostensibly to search for a missing War Office document. It was stated that papers were found connected with espionage and subversive propaganda, together with photostat apparatus and a few old rifles. The government declared that the U.S.S.R. had thereby contravened the terms of the trade agreement of 1921; and on May 24 not only was this agreement cancelled but diplomatic relations with the U.S.S.R. ceased for two years.

Arcot. Two districts in Madras province, India. North Arcot lies inland, W. of Madras city, and South Arcot is a maritime district stretching S. to Tanjore and Trichinopoly. The two were ceded to the British with the Carnatic, of which they form part.

North Arcot has an area of 4,671 sq. m. and a population of 2,577,540. Its surface is mountainous in the W., but elsewhere generally flat. Of its rivers, all of which dry up during the hot season, the largest is the Palar, on whose banks stand the towns of Arcot

and Vellore. Agriculture and weaving are the chief industries.

The district of South Arcot has an area of 4,205 sq. m. and a population of 2,608,753. Mountainous in the W., and low and sandy along the Coromandel coast, it is mainly a level plain drained by the Coleroon, Vellar, and other rivers, whose waters are drawn off by channels for irrigation purposes. The occupation of the inhabitants is mainly pastoral and agricultural, indigo and rice, millets and other cereals being the chief crops. The French settlement of Pondicherry lies within South Arcot.

Arcot. Town of Madras, India. The capital of N. Arcot district, and a military cantonment, it stands on the Palar, 65 m. W.S.W. of Madras, on the rly. to Beypur. Formerly the capital of the Carnatic, it was taken by Clive in 1751 and in 1758 by the French, who lost it in 1760. Hyder Ali captured it in 1780, and it became British in 1801. It has some ancient mosques and tombs. Pop. 16,583.

Arcot, SIEGE OF. British victory over the French in 1751. When the British and the French were fighting in India, Clive, with 200 English troops and 300 sepoys, took possession of the fort of Arcot, just outside the city, which the defenders left on his approach. His object was to draw off the French from Trichinopoly, where they were closely besieging an English garrison, and he succeeded.

Clive entered the fort on Aug. 31, 1751, strengthened the dilapidated defences, gathered provisions, and sallied forth against the enemy. On Sept. 23 the

French, with a large body of natives, took up their quarters in the city, and the siege of the fort began. Soon Clive had only 80 Europeans and 150 sepoys fit for duty, but, in spite of the ruinous condition of the walls and towers, he kept the enemy out. The fort was more than a mile in circumference, and the enemy were estimated at 10,000.

On Nov. 14 a final attack was delivered, elephants with iron plates on their foreheads being sent against the gates, but even this failed before the courage of Clive and his men, and the siege of seven weeks came to an end.

Previously the people of S. India had regarded the French as the dominant military power. But from this time the French never regained their influence, and the siege is therefore regarded as the turning point of the fortunes of Great Britain in India.

Arctic Circle. Parallel of latitude drawn $23\frac{1}{2}^{\circ}$ (approx.) from the North Pole. At midsummer, June 21, the axis of the earth is so tilted with reference to the sun that the rays of the latter pass $23\frac{1}{2}^{\circ}$ beyond the North Pole and fall short of the South Pole by the same distance. At midwinter, Dec. 21, the conditions are reversed. Thus it will be seen that the positions of the Arctic and Antarctic Circles are due to the inclination of the earth's axis, for if that were vertical, the half of the earth's surface illuminated by the sun at any given time would extend from North to South Pole, a condition only true on the days of the Equinoxes, *i.e.* March 21 and Sept. 23.

ARCTIC EXPLORATION AND DISCOVERY

Admiral Lord Mountevans, K.C.B., D.S.O.

This narrative describes the various expeditions that have gone out to discover the North Pole and to lands around it. See further the articles on those lands and those on the several explorers, Amundsen, Franklin, Nansen, Peary, and others

The exploration of the North Polar region has been actuated by two motives, the need for new trade routes or new trade commodities and a spirit of geographical inquiry which drove men towards the Pole itself. These two motives have been frequently combined, but, in general, the early explorations resulted from a trading search for either a N.W. or a N.E. passage to China, and the later journeys were scientific in aim. The early desire to achieve a voyage to the Far East by the Arctic Ocean awoke during the period of the great discoveries, and was akin to the spirit which prompted Columbus, Vasco da Gama, and Magellan; the later scientific expeditions aimed at investigating the magnetic, climatic, and oceanographic conditions which prevail in the frozen North.

Story of the North-West Passage

John Cabot began the search for a N.W. passage to the Indies in 1497; he discovered Newfoundland and in 1498 his son Sebastian reached 67° 30' N. Corte-Real, Verrazzano, and Gomez, in the period 1500-24, followed the Cabots, but did little more than inaugurate the lucrative Newfoundland fisheries. Frobisher in 1576 discovered the straits now named Frobisher and Hudson. John Davis made three voyages, achieved a farthest north at 72° 41' N., and explored long stretches of the coasts of Greenland and Labrador. Sanderson's Hope on the map indicates the headland which was his turning-point, and the name was abbreviated from the full title: "Sanderson His Hope of a North West Passage to India." Henry Hudson explored the east side of Hudson Bay and was left to his fate by mutineers after a winter in the ice of James Bay, 1610-11. Baffin attained on July 5, 1616, the lat. 77° 45' N., which was a record in that area for 236 years; he discovered Baffin Bay, Ellesmere Island, and Prudhoe Land. John Ross confirmed Baffin's discoveries in 1818 and penetrated Lancaster Sound for 50 miles. Parry in 1819 traversed Lancaster Sound and reached 114° W in 1820 among the Parry Islands, after spending the winter on Melville Island, and by so doing earned a reward of £5,000 offered by the British Government to the explorer who first went westward beyond 110° W. Other

explorers penetrated among the islands north of Canada, and in 1831 James Clark Ross located the North Magnetic Pole in Boothia Peninsula in 70° 5' N. and 96° 44' W. In 1845 Sir John Franklin with the ships *Erebus* and *Terror*, which had just returned from the Antarctic, led a well-equipped and very promising attempt to sail west from Lancaster Sound; he was last seen near the opening of Lancaster Sound. His failure to return as planned in 1847 stimulated both official and private persons to make vigorous efforts for his relief or to solve the problem of his disappearance.

The search for Franklin marks an epoch in the story of the N.W. Passage, but during the three centuries and a half between 1497 and 1848 other Arctic journeys had been made, most of which had some effect in producing the great outburst of activity in the years which followed 1848. James Cook in 1778 had sailed along the Asiatic and American shores east and west of Bering Strait, in an area where Russians had previously made explorations; in 1816 Kotzebue and in 1826 Beechey reached Kotzebue Sound. The fur trade, inaugurated in 1670 by the establishment of the Hudson Bay Company, led to overland journeys all aimed at discovering the North-West Passage. The mouth of the Coppermine was reached in 1771 by Hearne; and Mackenzie reached the mouth of the river which bears his name in 1789. In 1820 Sir John Franklin made great journeys by sledge and canoe in this region and discovered Point Turnagain; Back reached the Great Fish river in 1833, Dease and Simpson made further journeys in 1838-9; and Rae in 1845-7 completed the exploration of the Hudson Bay region.

Discovery of Franklin Relics

All these travellers had made the N. of Canada sufficiently familiar for land journeys in search of Franklin to be undertaken with some hope of success. Rae in 1848-54 traversed large areas and obtained from the Eskimos Franklin relics and an account of the death of 40 white men. Anderson in 1855, Hall in 1860-2, Schwatza and Gilder in 1878-9, continued Rae's work.

Search was also made by sea in Lancaster Sound, Hudson Bay, and Bering Strait; on one such voyage

McClintock in the *Fox* was beset by the ice in Melville Bay and drifted about 1,200 m. before he was free. He discovered in 1859 the only Franklin document ever found. The intrepid old man had died in June, 1847, and the ships had been deserted in the following April after being fast in the ice for eighteen months. Meanwhile McClure in the *Investigator* in 1850-3 reached Banks Island, which had been discovered by Parry, and demonstrated that there was a continuous N.W. passage by sea north of Canada; Collinson in the *Enterprise* during the same period made a similar voyage and obtained Franklin relics.

The cumulative result of all the discoveries showed that most of the members of the Franklin expedition had perished in an attempt to reach safety by a land journey for which they were ill-equipped, and demonstrated that Franklin had penetrated sufficiently far west to reach water navigable to the Pacific. The N.W. passage had been discovered, but it was not until Roald Amundsen navigated the *Gjoa* from sea to sea in 1903-5 that a ship made the complete voyage.

Trading Voyages to the Yenisei

The first efforts to make the N.E. passage led to Novaya Zemlya. Willoughby and Chancellor in 1553, Burroughs in 1556, Pet and Jackman in 1580 led the way for Barents, who made important discoveries in 1594-6. The Muscovy Company and the Amsterdam merchants profited by these discoveries to open up trade with Russia. Russian fur hunters gradually pushed their way along the coasts, the most notable being Deschnef, who sailed through Bering Strait to Kamchatka in 1648. Details of the coast were more fully explored during the period 1733-42 by the Russians Muraviev, Pronchistshof, Laptiev, etc. Nordenskiöld, after gaining experience in many expeditions during the years 1858-72, proceeded in 1875 to the Yenisei and returned overland, and repeated the journey in 1876; since then many trading voyages to the Yenisei have been successfully accomplished. In 1878 Nordenskiöld took the *Vega* within 120 m. of Bering Strait in one season, wintered off the coast at 123° E., and completed the voyage to the Pacific in 1879.

Whalers went to Spitzbergen, where it became a custom to pass the winter in time to be ready for work in the early spring. Pelham in 1630 was the first to do this. Henry Hudson had explored parts of the island in 1607; Norden-sköld, Leigh Smith, and many

others continued the explorations. The records "farthest north" attained in this area were Barents, 1594, 77° 20', near Novaya Zemlya; Hudson, 1607, 80° 23'. Whalers had habitually fished the waters of Davis Strait and the ocean E. of Greenland for nearly 250 years; the most notable of these was Scoresby, who followed much of the coast of East Greenland, and reached, in 1806, 81° 30' N., which was a record for this part of the Arctic.

The British Nares Expedition

The 19th century saw many attempts to reach the Pole, which were chiefly made from the Spitsbergen area on the east and by Smith Sound north of Baffin Bay on the west. Parry sailed in the *Hecla* in 1827 and reached 82° 45' N., north of Spitsbergen, on a sledge journey which kept him 61 days away from the ship. Kane left New York in 1853 in the *Advance* with the intention of using Eskimo help in a journey to explore N.W. Greenland; he spent two winters in the Arctic, passed through Kane Basin into Kennedy Channel, and reached 80° 10' N., a record for that region. Hayes in the *United States* followed up these voyages and added to men's knowledge of Ellesmere Land. In 1871 the *Polaris* in the Hall expedition had the good luck to sail through Kane Basin, Kennedy Channel, Hall Basin, and Robeson Channel into the Polar Sea and to achieve the record for a ship of 82° 11' N. This success led to the British Nares expedition of 1875; with great difficulty the ships were taken through the unfavourable ice conditions and the *Discovery* wintered in *Discovery Harbour* and the *Alert* wintered at *Floeberg Beach*, 82° 24' N., and established a new record; sledge journeys were undertaken and Aldrich beat Parry's furthest by attaining 82° 48' N., and A. H. Markham the next year reached 83° 20' N.; coast lands were explored and valuable observations made concerning geology, natural history, meteorology, and tidal conditions. The sledge journeys were carried out under very great hardships.

Meanwhile Swedish expeditions had been at work north of Spitsbergen; von Otter took the *Sofia* to 81° 42' N. in 1868, and Nordenskiöld tried to reach the Pole by reindeer sledging in 1872. In this year Weyprecht and Payer started on an Austrian expedition with the *Tegetthof*, discovered Franz Josef Land, and reached in 1874 Cape Fligely, 81° 51' N., the nearest known land to the Pole;

Leigh Smith in the *Eira* explored much of this archipelago in 1880-1. In 1894 Alfred Harmsworth patriotically sent Jackson in the *Windward* to explore this area thoroughly; he returned in 1897.

From 1770 to 1820 Russians had explored the islands north of Siberia, and Wrangel's companion Anjou reached 76° 36' N. in 1823 and failed to discover the large area of land which was believed to exist in that region. This belief was held until 1881, when De Long's ship, the *Jeannette*, made a great drift across the Arctic Ocean from north of Wrangel Island to N.W. of De Long Islands.

Scientific work in the Arctic received a great impetus by the establishment in 1881-3 of the international circumpolar stations set out below:

Lat. N.	Long.	Country	Leader
81° 44'	64° 45' W.	U.S.A.	Greely
78° 25'	16° E.	Sweden	Ekholm
73° 23'	124° E.	Russia	Jurgens
72° 23'	52° 44' E.	Russia	Andeff
71° 16'	158° 40' W.	U.S.A.	Ray
71° 0'	64° E.	Denmark	Hovgaard
70° 0'	8° 28' E.	Austria-Hungary	Wohlgermuth
69° 56'	23° E.	Norway	Steen
67° 24'	26° 36' E.	Finland	Lemstrom
66° 36'	67° 19' W.	Germany	Giese
64° 11'	51° 40' W.	Denmark	Paulsen
62° 39'	115° 44' W.	Britain and Canada	Dawson

The importance of the scheme lay in the attempt to make throughout a whole year systematic and simultaneous observations by trained scientists at as many spots as possible on the edge of the unknown Polar Sea.

Nansen's Famous Voyage

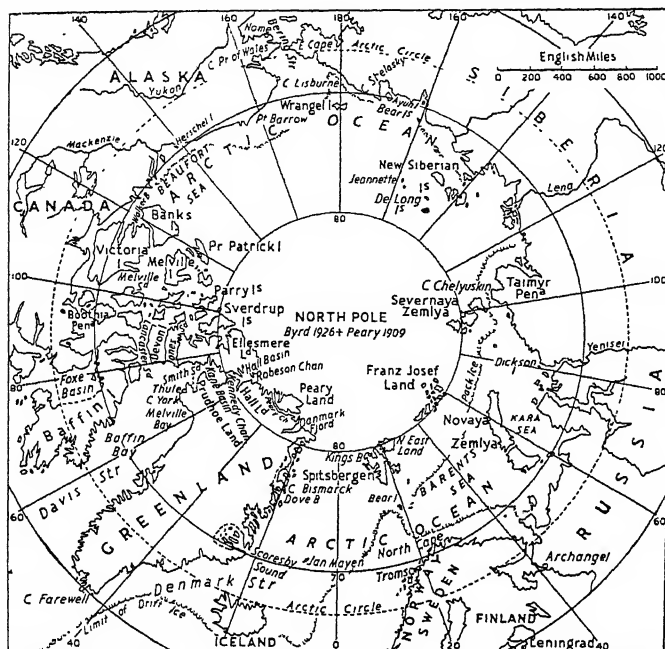
The most notable of these expeditions was that of Greely. Lockwood, his second in command, explored the Greenland coast and discovered Lockwood Island in 83° 24' N., and set up a new record for nearest the Pole; and both Lockwood and Greely made land journeys and explored some 6,000 sq. m. of newly discovered land.

In 1893-6 Nansen, who had previously, in 1888, accomplished the first crossing of the Greenland ice-cap from E. to W., made one of the most famous of polar voyages. He had a specially constructed ship, the *Fram*, and set out deliberately to have his ship beset by the ice in order to drift over the Arctic Ocean in the fashion of the *Jeannette* and, if luck favoured him, to float over the Pole. Frozen in about 79° N., the *Fram* drifted with the ice. Nansen and Johansen attempted a dash for the Pole over

the ice; they reached 86° 14' N. and were ultimately rescued by Jackson in Franz Josef Land. The *Fram*, under Sverdrup, drifted on, gained 85° 57' N., rounded the N.E. of Spitsbergen, and safely reached Norway. In 1899 Sverdrup took the *Fram* west of Greenland and explored Jones Sound. In the same year the duke of the Abruzzi's expedition sailed for Franz Josef Land, and Cagni reached 86° 34' N. by sledge in 1901. In 1897 a most risky attempt to gain the Pole by balloon was made by Andrée from Spitsbergen; no trace of this abortive attempt, beyond three message buoys dropped on the first day of the journey, was found until 1930 when the remains of Andrée and his two fellow aeronauts were discovered at White Island near Franz Josef Land.

Robert E. Peary was the most persistent of the Arctic explorers. He commenced operations in 1886 by a journey on the Greenland ice-cap; in 1891-2 and 1893-6 he made journeys across N. Greenland; in 1898-1902 he explored Ellesmere Land, rounded the N. end of Greenland, reached 84° 17' N. These land journeys familiarised him with the Eskimos and ice conditions. He wintered his ship, the *Roosevelt*, in the Arctic Ocean in 1905, and gained 87° 86' N. He acquired valuable experience of the ice on the open ocean and established a record by bringing the *Roosevelt* safely home. In 1908 he took the *Roosevelt* to the earlier winter quarters, organized a thorough series of relay expeditions, gained the Pole on April 6, 1909, and found no land in sight and a deep sea below the ice-crust.

While Peary had been making his repeated attacks on the N. Pole, the Mylius-Erichsen expedition, greatest of all Danish Arctic ventures, explored Melville Bay and wintered at Cape York. Leaving Copenhagen in the sealer *Denmark* in June, 1906, with a strong scientific staff, Mylius-



Arctic Exploration. Map of the north polar regions, showing their relation to adjacent continents. The Arctic circle is marked by a dotted line

Erichsen led an inspired company to explore and observe a great part of unknown Greenland. Using over 100 sledge dogs, this expedition gave to the world a great store of scientific and geographical knowledge, but it suffered the loss of its leader and two companions through relying on the erroneous map of earlier explorers. Mylius-Erichsen was, through shortage of food, compelled to part company from his supporting sledge-party under Lieut. J. P. Koch, and sailed away, never to be seen again.

Koch's complete sledge journey was one of the finest ever made in the Arctic—1,400 m. in 88 days, 570 m. over undiscovered country. To the Mylius-Erichsen expedition we owe the credit of discovering and charting all the land beyond Bourbon Is., 130 m. N. of Cape Bismarck. The scientific results of this journey were of great value and interest, chief of which was completing the main outline of Greenland, and proving finally that it was an island. Many fossils were found amongst the collections made. On this expedition nearly 200 sledge and boat journeys were made.

Capt. Mikklesen, who in 1908 conducted a search for the relics of the dead explorers, brought home records that disproved the existence of the Peary Channel.

To Mikklesen, and his companion Iversen, may be attributed one of the most Homeric of Arctic journeys—600 m. with insufficient food, with first the leader suffering badly from scurvy, and then his companion falling a victim to the disease. Mikklesen and Iversen were alone for twenty-eight months out of the three years spent by their expedition in Greenland; their story was a most remarkable tale of heroism and sacrifice. Mikklesen made the first crossing of the inland ice-cap between Dove Bay and Danmark Fjord.

Exploration of Greenland

Greenland's glacial plateau has received great attention in recent years. Nansen's crossing of S. Greenland in 1888 and Peary's in the N. in 1892 were followed by more difficult and hazardous crossings by Rasmussen, 1912. The Swiss scientist, De Quervain, 1912, Koch, 1913, Rasmussen, 1916, Hoygaard, Rymill, and Scott, with various companions; all helped to prove that inland meteorological and magnetic stations at high altitudes could if necessary be established and maintained throughout the year in the Arctic, just as Antarctic explorers had proved this possibility in the cruel, white South. This Greenland plateau is a million sq. m. in area, or about five times the size of France, and as

high as 9,000 ft. A journey from N. to S. is about the same distance as from Copenhagen to the Sahara.

Russia has sent many expeditions into the Arctic-Siberian sector. Capt. Vilkitsky, with ice-breakers, attempting the N.E. passage, found islands in the new Siberian group, and in 1913 discovered extensive land, which he named Severnaya Zemlya or Northland, running in a S.E. to N.W. direction up to the 80° parallel and beyond. Vilkitsky was second to Nordenskjöld in making the N.E. passage from W. to E., but first to make it from E. to W.

Roald Amundsen, first to reach the S. Pole, resumed his Arctic explorations in the summer of 1918, when, sailing from Tromsø in his specially constructed ship *Maud*, and taking the N.E. passage as the shortest route from Norway, he passed Cape Chelyuskin and fixed its position on Sept. 9 as the most N. point of Asia, in 77° 44' N., 104° 17' E. The *Maud* wintered in the lee of two small islands, the only shelter available. Amundsen was nearly killed by a bear, and nearly suffocated by a stove later on. His heart was affected, and his lacerated arm troubled him until he obtained surgical aid three years later. The *Maud* broke free on Sept. 12, 1919, when two of her crew left to bring letters and news to Norway, a hazardous business in which they both perished. She made poor progress eastward in 1919, and after passing S. of the new Siberian Islands was forced to winter a second time at Ayun Island near Cape Shelasky. In Aug., 1920, she reached Nome in Alaska; four other men returned home, leaving Amundsen with only three companions to work the ship when he sailed for his projected drift across the Polar sea. All went well until the propeller broke near East Cape, when Amundsen was compelled to winter a third time at Cape Serolekamen. In the spring of 1921, five natives helped to sail the *Maud* to Seattle. Amundsen then turned to flying.

In June, 1922, however, he sailed in the *Maud* from Seattle, with provisions for seven years; but with unfavourable ice conditions at the beginning of the voyage, he handed over command of his expedition to Capt. Wisting, who conducted the Polar Drift. The *Maud* spent next winter in heavy pack, drifting steadily towards N.W., and reaching 74° N. and 170° E. by March 10. In June lat. 75° 30' was reached, and for another two months her track

nearly coincided with that of the Jeannette in 1879-80. After passing another winter S. of De Long Islands, she received in Feb., 1924, a message to abandon the voyage. Unfortunately the ship was again caught in the ice near the Bear Islands, and did not end her long voyage until Aug. 22, 1925. Sverdrup, who accompanied this expedition, contributed largely to the scientific results. Wisting failed to take advantage of the drift existing from N. of Bering Strait to the N.W. across the Arctic Basin.

In 1932 the Russian explorer Schmidt became the fourth man to make the N.E. passage—in the ice-breaker *Sibiriakov*—in the record time of nine weeks. From 1936 onwards, following Schmidt's further exploration in the ice-breaker *Chelyushkin*, new Russian commercial routes, internal and external, were opened up.

That modern Viking Amundsen, in May, 1925, made a flight to lat. 87° 43' N. With Riiser-Larsen as pilot, he flew with two Dornier flying boats from W. Spitsbergen. Lincoln Ellsworth joined him on May 23, after Amundsen had been compelled to come down in an open water lead since half his fuel had been expended. It was a hazardous business for lightly constructed seaplanes to descend among the ice floes, and one machine was wrecked. The two crews, six men in all, lived in the cabin of the undamaged machine until June 15, when, abandoning everything but the barest necessities, they returned. Amundsen reached the N. Cape, and his party was rescued thence by a Norwegian cutter.

Polar Flights

On May 9, 1926, the U.S. explorer, Richard Byrd, took off from King's Bay, flew to the Pole, encircled it, and returned to his base—all in 15 hours. Two days later Amundsen set out in the airship *Norge*, piloted by the Italian Nobile; they crossed the Pole, and landed in Alaska May 14.

Polar flights now became almost fashionable. Nobile, promoted general, took the dirigible airship *Italia* to the N. Pole in 1928, but she was wrecked over the pack ice. Six of her crew were killed, and Nobile himself injured. The valiant Amundsen, who took part in the search, lost his life when his Dornier came down in the sea.

Exploration by air having revolutionised Polar travelling, the names of some of the greatest Arctic explorers, like Rasmussen and Stefansson, are apt to fade

into the background of public memory, but to Rasmussen must be attributed the founding of the most northerly settlement in the world. It is on North Star Bay, in the N.W. part of Greenland, lat. 77° N. Rasmussen named it Thule. In his extensive sledge trips he found undulations similar to those on the Antarctic plateau, and used both igloos and tents in travelling with his dog teams, who for five or six days on end could average nearly 50 m. a day.

Students' Expeditions

The British did nothing in the Arctic for many years. Then in 1921 George Binney and young men from Oxford and Cambridge inaugurated a new school of British explorers, splendid types like Gino Watkins and Wordie—often classical scholars rather than scientists. They chartered little motor vessels and fearlessly faced the hazards and hardships of the North. Often they took to the air, sometimes they used motor boats, or even kayaks.

Germany has taken a small part in Arctic research. In July, 1930, Wagener established a plateau station, 240 m. E. of Kamarujuk, midway between the E. and W. coasts of Greenland, at a height of 9,700 ft. He lost his life attempting to reach the E. coast, where a station had been set up in Scoresby Sound. The expedition returned to Copenhagen in Nov., 1931.

The Arctic cruise of the German airship *Graf Zeppelin*, commanded by Hugo Eckener, was undertaken at the end of July, 1931, for geographical and scientific purposes. The airship passed over Severnaya Zemlya group of islands and the Taimyr Peninsula, Dickinson Island, and near Sverdrup Island, thence along Novaya Zemlya and back to Russia via Archangel. The air view of the Arctic, now for the first time properly photographed, revealed much that was unknown.

In 1928 Sir Hubert Wilkins, who served his Arctic apprenticeship with Stefansson, one of the greatest authorities on the Eskimos, and one of the greatest of Arctic travellers, made his famous flight across the Arctic regions from Point Barrow to Spitsbergen.

In May, 1937, a party of scientists led by Schmidt landed 15 m. from the N. Pole and stayed there until the ice floe on which they had camped drifted southwards. They were taken off by an ice-breaker in 1938.

The 80-ton motor patrol vessel of the Royal Canadian Mounted Police, *St. Roach*, completed the

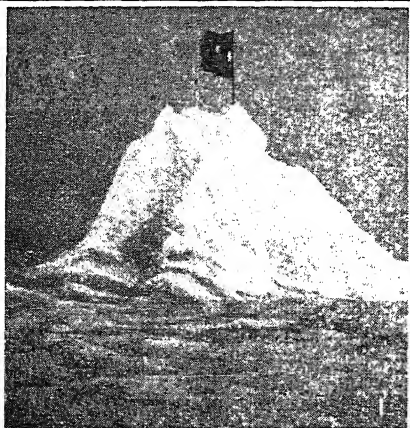
N.W. passage from W. to E. in 1942, under Sgt. H. A. Larsen, a naturalised Canadian born in Norway. The expedition left Vancouver June 21, 1940, and reached Point Barrow on July 22; thence the *St. Roach* voyaged via Herschel Island, Cambridge Bay, and Walker Bay. Wintering at Victoria Island, she voyaged on in July, 1941, and spent a second winter at Pasley Bay. Finally the vessel worked and drifted through the ice and made the Hudson's Bay Company post at Fort Ross, which she left Sept. 2, 1942, to reach Battle Harbour Sept. 22: an epic achievement for such a lightly constructed vessel.

Over the Magnetic Pole

On May 10, 1945, a notable flight in Arctic regions was undertaken by the R.A.F. in a Lancaster aircraft, *Aries*, with the object of flying over the N. and the N. Magnetic Poles. The expedition was captained by Wing-Comdr. McKinley, with Wing-Comdr. McClure, R.C.A.F., as senior observer.

They flew from Reykjavik direct to the N. Pole and back; thence to Goose Bay in Labrador, from which course was laid to the Magnetic Pole, which was located in approximately 76° N., 101° W. Then from Whitehorse, Yukon, a non-stop flight of more than 4,000 m. was made across the N. Magnetic Pole again, and then right across Greenland and the N.E. coast of Iceland. The expedition's aims were to study air crew efficiency and navigational problems peculiar to polar flying; to examine the behaviour of compasses, radar installations, and automatic dead-reckoning gear; to collect meteorological information; and to study topography in the region of the Magnetic Pole. About 2,000 photographs were taken. This was the first time the Magnetic Pole was flown over. Its position was reported to be about 250 m. N.W. of its last presumed position, an observation confirmed in 1946.

Bibliography. *The First Crossing of Greenland*, F. Nansen, trans. H. M. Gepp, 1890; *Farther North than Nansen*, Duke of the Abruzzi, 1901; *Nearest the Pole*, R. E. Peary, 1907; *Handbook of Polar Discoveries*, A. W. Greeley, 1910; *The North Pole*, R. E. Peary, 1910; *The Call of the North*, H. Houbert, 1932; *The Conquest of the North Pole*, Rev. G. Hayes, new ed., 1937; *War Below Zero*, B. Balchen, C. Ford, and O. La Farge, 1945; *The Polar Record*, ed. F. Debenham, issued annually.



1. Stars and Stripes flying over the North Pole, marking the triumph of Peary, who, in 1909, was the first explorer to reach it. 2. Peary's expedition on the march. 3. Ice floes of the Kara Sea photographed from the Graf Zeppelin in July, 1931. 4. In May, 1926, Byrd

flew over the North Pole, with Floyd Bennett as pilot; here is seen their Fokker monoplane starting from Spitsbergen. 5. Rescue ship Braganza caught in the ice floes during her search for Nobile after his ill-fated flight to the Pole in the dirigible Italia in 1928

ARCTIC EXPLORATION: DESOLATE REGIONS WHICH HAVE BEEN CONQUERED BY MAN
 Photos 1 and 2, from "The North Pole," by R. E. Peary, by permission of Messrs. Hodder & Stoughton

Arctic Ocean. Term applied generally to the waters N. of Europe, Asia, and America. These include the Greenland and Norwegian Seas between Greenland and Norway, the Barents Sea N. of Europe, the White Sea, the Kara Sea between Novaya Zemlya and Yamal Peninsula, and the Beaufort Sea N. of Alaska. It communicates with the Atlantic by Davis Strait, Denmark Strait, and the sea between Iceland and Norway. Its only connexion with the Pacific is by Bering Strait.

It is the best defined and smallest of all the oceans, but, except as regards the Greenland, Barents, and White Seas, is inadequately explored. The polar basin as far as is known has a maximum depth of 2,950 fathoms, which occurs on the Asiatic side of the North Pole; near the pole itself Peary failed to reach bottom with 1,500 fathoms of line. The floor rises steeply to a broad continental shelf with depths of less than 200 fathoms, and often less than 100 fathoms. On this broad shelf lie Spitsbergen, Franz Josef Land, Novaya Zemlya, Severnaya, Zernia, the New Siberia Islands, Wrangel Island, and the Canadian Arctic Archipelago. The Greenland Sea forms a second deep basin, cut off from the polar basin by a submarine ridge in about lat. 80° N. and from the North Atlantic by the Farøe-Icelandic ridge in about 300 fathoms. Baffin Bay and Davis Strait form a third basin, which is seldom over 300 fathoms in depth and is cut off from the polar basin by ridges within 50 to 100 fathoms below the surface. Bering Strait is about 30 fathoms deep.

The bottom deposits of the Arctic Ocean are mainly of terrigenous origin derived from numerous large rivers, the Pechora in Europe, the Ob, Yenisei, Lena, and Kolyma in Asia, and the Mackenzie in America. The salinity of the surface waters is low. Surface temperature has an annual range of only a few degrees, and is generally about 29° F., except in the eastern part of the Greenland Sea and in the Barents Sea, which are influenced by a branch of the warm North Atlantic drift. These two seas are the only parts of the ocean which are not blocked by ice in winter. About three-quarters of the inner polar basin remains permanently frozen, but navigation is possible in the summer months in the Greenland, Barents, and White Seas, along the N. coasts of Europe, Asia, and

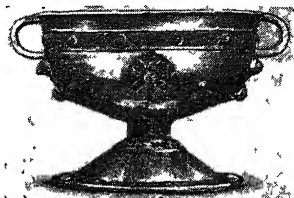
Alaska and in Davis Strait and Baffin Bay. The U.S.S.R. has developed the navigation of the N.E. passage by using ice-breakers, aeroplanes, and radio ice and weather reports. The chief current besides the branch of the North Atlantic drift already mentioned seems to be a general drift across the pole from eastern Asia to Spitsbergen and Greenland. It was this drift that the Fram used in 1893-6, as did the Soviet North Pole expedition of 1937. Circular currents occur in the Greenland Sea. Cold currents pass down the E. and W. coasts of Greenland, carrying ice southwards, which is often a menace on the Atlantic trade routes. There is also a cold current of less importance through Bering Strait to the Pacific. The configuration of the floor of the Arctic Ocean prevents the deeper waters from reaching the Atlantic and Pacific Oceans. Animal life includes bowhead and finner whales, various seals, many kinds of fish, and a rich invertebrate fauna. Diatoms are often abundant enough to colour the surface waters green.

Arcturus or **ALPHA BOÖTIS** (Gr. *arktos*, bear; *ouros*, guard). Principal star in the constellation of Boötes, the Herdsman, and third brightest star in the northern sky. It has a very large proper motion, which in the space of 800 years carries it across a space in the sky equal to the apparent diameter of the moon. Yet it has a small parallax, and is therefore very distant, so that its speed of movement has been estimated at 84 m. a second, and its light is about a hundred times that of the sun. It is easily found, apart from its brightness. Starting from the pole star, the last star in the handle of the Plough leads straight to Arcturus.

Arcueil. Town of France, in the dept. of Seine, virtually a S. suburb of Paris. Its name is derived from Arcus Iulianus, a Roman aqueduct. Between 1613 and 1624 and again between 1868 and 1872 an aqueduct was built in connexion with the water supply of Paris, the two together reaching a height of 135 ft. The town has quarries and some manufactures.

Arculf (fl. c. 680). Frankish bishop. One of the earliest Christian travellers after the rise of Islam, he visited the Near East about 680, and later told his experiences to Adamnan, abbot of Iona in the Hebrides, from whose account the story was continued by Bede in his Ecclesiastical History.

Ardagh. Village of co. Limerick, Eire, 4 m. N. of Newcastle. In 1868 there was discovered here the sole surviving chalice of Celtic craftsmanship. Of the 8th or 9th century, this is a two-handled pedestalled cup, 7 ins. high, 9½ ins



Ardagh Chalice. Richly decorated vessel of 8th or 9th century Celtic work
Dublin Museum

across, composed of 354 pieces, silver (20½ oz.), bronze, gold, lead, enamel, glasse, amber, and mica. Its ornament includes scrollwork, filigree interlacings, together with the names of the twelve Apostles. Another Ardagh is in co. Longford.

Ardagh, Sir John Charles (1840-1907). British soldier. Born in co. Waterford, he was educated at Trinity College, Dublin, and the R.M.A., Woolwich. Foreign service took him to Egypt and the Sudan, 1882-7, and he was secretary to the viceroy of India, 1888-94. Specialising in intelligence work, he estimated before the Boer War that the British would require an army of 40,000 to defend their colonies or of 200,000 to conquer the Boers.

Ardalan or **ARDILAN.** Province of N.W. Persia also known as Kurdistan. It lies between Azerbaijan to the N. and Kermanshah to the S., and touches Iraq on the W. It is mountainous and has a severe winter, but the tablelands and the valleys provide good pasture. The pop. is mostly nomadic, though Sinneh, the chief town, has some 32,000.

Ardashir or **ARTAXERXES.** Name of three Persian kings of the Sassanid dynasty (A.D. 226-651). The first, the founder of the dynasty and regenerator of the empire, reigned from 226 to 241. He encouraged his countrymen to revolt against the Arsacidæ (Parthians), to whom Persia was then subject, and by a decisive victory restored his country's independence. During his reign there were conflicts with the Romans under Alexander Severus. Ardashir was a devout Zoroastrian, and the first Persian ruler to assume the title of King of Kings. Ardashir II and Ardashir III reigned from 379 to 383 and from 628 to 630 respectively.

Ardeatine Caves. These caves on the Appian Way near Rome, long used as a dumping place for city refuse, were the scene on March 23, 1944, of a massacre by German troops of 335 Italians in reprisal for the killing by a bomb of 32 German S.S. men in Rome. The victims were indiscriminately picked from the city streets and prisons, marched to the caves, and shot. Mines were exploded and the caves collapsed. The site is now a national monument. The two German generals responsible, von Mackensen and Maeltzer, were sentenced to death by a British military court in 1946, but this sentence was commuted to life imprisonment in 1947. A memorial to the victims in the form of a huge sepulchral stone was erected there in 1949.

Ardebil OR **ARDABIL.** Town of Persia, in Azerbaijan prov. Once a great city, it stands on the Kara Su, 100 m. N.E. of Tabriz. A place of pilgrimage, it is famous for hot mineral springs. Pop. 63,000.

Ardeche. Department of S.E. France. Bounded E. by the Rhône and named after its tributary, the Ardèche, it contains part of the ancient prov. of Languedoc and has an area of 2,144 sq. m. Situated in the Cévennes region, it has magnificent scenery. Its industries are mainly pastoral; the vine and the mulberry tree are largely grown, silkworms are reared, and there are some manufactures and mining undertakings. Privas is the capital. Pop. 254,598.

Ardee. A market town of co. Louth, Eire. On the Dee, 43 m. N.W. of Dublin by railway, it has a grain trade, distilleries, and tanneries, and manufactures baskets. Formerly the seat of a Carmelite friary, it has a 13th century castle, now the town hall. It received a charter in 1377, suffered much in the Irish and English wars, and was involved in the Sinn Féin rebellion of April, 1916. Market day, Tues. Pop. 2,368.

Arden, FOREST OF. A district of Warwickshire, England. To the N. of the Avon, it was formerly a much larger forest tract. It is still a well-wooded area, and is known as the woodland country, as distinct from the feldon or open country S. of the river. Shakespeare was well acquainted with the Forest of Arden, scene of most of *As You Like It*.

Ardennes. A range of hills in France, Belgium, and Luxembourg. It is the remains of a great forest which, extending

probably to the Rhine, is mentioned by Caesar and other early writers; today it is confined to the wooded heights on either side of the Meuse. The Belgian Ardennes, *i.e.* the woods to the E. and S. of Dinant, were a popular holiday resort. Game and wild animals are plentiful, and include the wild boar. Coal, iron, lead, and other minerals are worked.

Ardennes. A department of France. Bounded by Belgium and the departments of Aisne, Marne, and Meuse, it has an area of 2,027 sq. m. The rivers Aisne and Meuse flow through it, and are joined by the Canal des Ardennes. Mining, especially of slate, and agriculture are the chief industries. Part of the Argonne is herein. Mézières is the capital, other towns being Rocroi, Sedan, Rethel, and Charleville. Pop. 245,335.

Ardennes, FIGHTING IN THE. The Ardennes district figured in two important battles of the Second Great War. The first was the German break-through of May, 1940, opening move in the first battle of France. A German force of about 50 divisions had been marshalled, almost in full view of Allied observers across the frontiers, as French objections had prevented the bombing of enemy formations thus building up. Gen. (later F.-M.) von Rundstedt was in chief command of this large force, which after the break-through was charged with other important operations. Four German armies were included—under Gens. Kluge, Blaskowitz, Witzleben, and Bock. Guderian's two armoured corps were attached to the first two as a spearhead.

After crossing the Meuse and the Albert Canal (May 10–12), German armour and infantry pressed forward through the Ardennes. The region was thought to be impracticable terrain for armoured forces, and was therefore only lightly manned by French and Belgian troops. But by May 13 the enemy had reached the Meuse at a point west of Liège, and from Namur to Sedan German forces were within striking distance of the Meuse bridgeheads. The French 9th army (Gen. Corap) held the sector Namur-Mézières, which was virtually the hinge of the Allied line. Corap's troops were taking up positions when, on May 13, the Germans approached the Meuse. Across half a dozen bridges here, left undemolished by the French, the Germans poured, making a gap 50 m. wide in the Allied line.

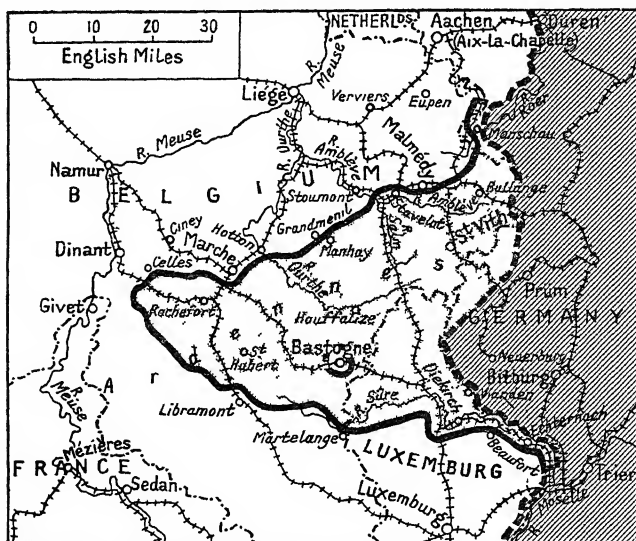
On Corap's right was the French

2nd army, in front of Sedan. Early on May 13 the French here were driven back and their line was breached. Sedan was abandoned. Corap's army fell back in disorder. Its commander was dismissed on May 14. Gen. Giraud, appointed as his successor, was captured by the Germans on May 16 at La Capelle. By now, along the sector between Namur and Sedan, the battle had become open warfare. The German break-through had been complete, and in due course enforced a withdrawal of Allied troops in Belgium, and the defeats ending in the evacuation of Dunkirk (*q.v.*).

The Ardennes again became the scene of heavy fighting during the last German counter-offensive of the war (*see map*, p. 588). The region had been liberated by the U.S. 1st army in Sept., 1944. An Allied offensive, with a line-up along the Rhine as its objective, began in Nov. By mid-Dec. the U.S. 9th and 1st armies had advanced beyond Aachen to the left bank of the Roer river; the U.S. 3rd army had reached the Saar. But the line between these sectors was held very lightly. Once again too much reliance had been placed on the undoubted difficulty of the Ardennes country, then in the grip of winter, for on Dec. 16 Rundstedt began an attack from a line Monschau to Echternach. Under cover of fog, which had prevented air reconnaissance, he had assembled the 5th and 6th Panzer armies (ten armoured divs.) and 14 infantry divs., also a Panzer brigade which operated in U.S. equipment and caused confusion and panic in and immediately behind the U.S. front line.

Four U.S. divs. in the Eifel area met the first onslaught, slowing but not stopping it; a fifth held St. Vith for several days. But a breach was made in the Allied line which cut off the 1st and 9th armies from their group h.q. in Luxembourg. Gen. Eisenhower immediately ordered a cessation of attack to N. and S. and concentration of all possible forces in the danger zone, to prevent the Germans from widening the base of their assault. He also placed 1st and 9th armies temporarily under F.-M. Montgomery.

Airborne, armoured, and infantry units were moved up from reserve, the 101st U.S. airborne div. with armoured support being placed at the vital road junction of Bastogne, where it was surrounded by superior German forces on Dec. 21.



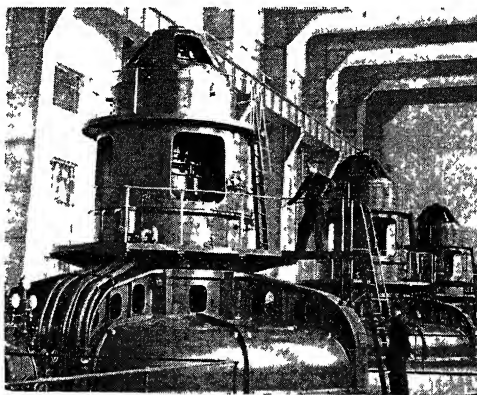
Ardennes. Map of the country affected by the last German counter-offensive, Dec., 1944. The shaded area indicates greatest extent of German penetration

The flanks of the breach at Monschau and Echternach were held, and the salient compressed from N. to S.; but penetration threatening the Meuse developed on a narrowing front, the Germans being aided by continuing fog until on Dec. 22 the weather improved, and Allied air forces began violent attacks on German rear communications. Relief by an armoured division of the 3rd army reached Bastogne on Dec. 26, on which day also the German drive, 45 m. wide at its base, and 60 m. deep, was stopped near Celles, within 4 m. of the river. The initiative then passing to the Allies, the 1st army attacked from the N. towards Houffalize on Jan. 3, 1945, the 3rd army from the S. towards the same place on Jan. 9. By Jan. 10 they were only 10 m. apart, and the Germans were beginning to withdraw from the tip of their salient. On the 16th they met, and on an unbroken front began to press the Germans eastward. The 1st army retook St. Vith on Jan. 27, and by the end of the month the Allied line was restored to what it had been before Rundstedt began his last counter-offensive.

Ardglass. Parish and town of co. Down, N. Ireland. Picturesquely situated amid hills at the head of a small bay, 6 m. S.E. of Downpatrick, it is served by a branch rly. line. It was at one time the second commercial town of Ulster, but its trade has greatly declined. Small vessels can enter the harbour, a station for the

herring fishing fleet. Ardglass has ruins of several old castles or forts, said to have been built as stores by an English trading company in the reign of Henry IV. Pop. 786.

Ardingly. Village of Sussex.



Ardnacrusha. Section of the huge power house of the Shannon power installation, near Limerick

England, 5 m. N. of Hayward's Heath. Here, dating from 1858, is one of the public schools founded by Canon Woodard. Otherwise the village history is dominated by memories of the Colepeper family, one of whom in 1590 built Wakehurst Place.

Ardlamont Mystery. Shooting fatality at Ardlamont, Argyllshire, Scotland, on Aug. 10, 1893. The victim was a youth named Hamborough, who was reading for the army with Alfred John Monson. Hamborough had recently insured his life for £20,000,

and assigned the policies to Mrs. Monson "for money received." At Monson's trial for murder, at Edinburgh, in Dec., the defence declared that he was aware that the assignment was void in Scots law, as made by a minor; and the verdict was "not proven." A man named Scott, summoned as a witness, was formally outlawed on failure to appear, the ban being later removed. On July 3, 1898, at the Old Bailey, London, Monson was sentenced to 5 years' penal servitude for conspiring to defraud the Norwich Union Life Insurance Society.

Ardlui. Village of Dumbartonshire, Scotland. It stands at the N. end of Loch Lomond, and has a railway station. It is also on the well-known motor road W. of the loch, and is a popular centre for boating, fishing, and mountain climbing, with Ben Vorlich (3,092 ft.) in the vicinity.

Ardnacrusha. Locality in co. Clare, Eire, 3 m. N. of Limerick across the Shannon. Here is the hydro-electric power-station in the scheme which harnesses the force of that river. The construction, carried out by the firm of Siemens-Schückert, was begun in 1925, and finished towards the end of 1929. Each of the three vertical turbines can develop 38,500 h.p.

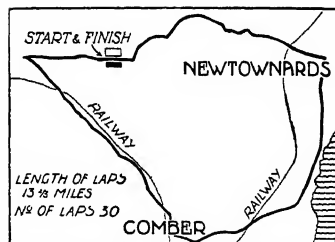
Ardnamurchan. Parish of Argyllshire, Scotland. It forms the westernmost portion of the mainland, covers an area of 171 sq. m., and has a pop. of 1,137. The estate of Ardnamurchan is noted for its deer forests, beautiful rocky scenery, and salmon fish-

eries, and contains the ruins of Mingary Castle, the ancient seat of the MacIans, which was twice taken by James IV and was ravaged by the Macdonalds of Antrim, 1644. Ardnamurchan Point is the westernmost extremity of the mainland of Great Britain.

Ardoch. Parish and village of Perthshire, Scotland. It is 12 m. N.N.E. of Stirling, and has the best-preserved Roman camp in Great Britain. The camp measures 500 ft. long by 430 ft., has huge ramparts and deep ditches, and retains three of its four gates.

Ardrossan. Police burgh, seaport, and holiday resort of Ayrshire, Scotland. It is 30 m. S.W. of Glasgow by railway, and is a thriving town with a well-sheltered and accessible harbour, and commodious dock accommodation. Shipbuilding, engineering, oil storage, and fishing are the leading industries, and chemicals and coal the chief exports. The town owes its rise to the harbour. It was begun in 1806 by the 12th earl of Eglinton, and was to have been connected by a canal with Glasgow. The undertaking proved to be too ambitious and costly, and a few years before the death of the earl in 1819 the scheme was temporarily abandoned. The next earl carried on the work, and in 1833 the harbour, a much smaller one than originally planned, was completed, the total outlay having exceeded £200,000. Ardrossan has ruins of the castle of the Montgomeries, captured by Wallace, and razed by Cromwell. Pop. 8,675.

Ards Circuit. A motor-racing course near Belfast, Northern Ireland, used annually 1928-36 and from 1947 for the Tourist Trophy race organized by the Royal Automobile Club. The course is 13½ m. of ordinary roads specially closed for the occasion. The highest average speed at which the race over 30 laps was won was 78.01 m.p.h., by F. W. Dixon and C. J. P. Dodson, driving a Riley, 1936.



Ards Circuit. Motor-racing course near Belfast. One section borders Strangford Lough (shaded)

The record for one lap is 85.52 m.p.h., by L. Lebègue, driving a Delahaye in the same year.

Ardley. Urban dist. in the W. Riding of Yorkshire, England. It is 4 m. N.E. of Wakefield by the railway, has extensive collieries, and manufactures woollens and bricks. It is divided into East and West Ardley. Pop. 9,215.

Are (Lat. *area*, piece of level ground). French unit of superficial or land measure. It is a

square whose sides are each 10 metres long, thus containing 100 sq. metres, equal to 119.6 English sq. yards. Ten ares equal one decare, 100 ares one hectare.

Area. Numerical measure of superficial extent. If geometry, as its name implies, originated in the measurement of land, the concept of area was probably the primitive geometrical idea. The unit of area is naturally the square whose side is the unit of length, e.g. the square foot or the square yard. The idea of area is naturally applied in the first instance to a plane surface, but may be extended to curved surfaces, such as the cylinder, cone, and sphere. See Circle; Geometry; Sphere, etc.

Areca. Genus of lofty palms belonging to the family Palmae. Natives of the tropics, they have a crown of long, graceful leaves which are broken up into numerous slender leaflets in two rows. *A. catechu*, of India, produces the well-known betel-nuts and catechu. Areca nut is used as a vermifuge for dogs.

Arecibo. Town of Puerto Rico. It stands on the N. coast, 30 m. by rly. W. of San Juan, and exports coffee and sugar. Its harbour is an open roadstead. Pop. 11,000.

Arena (Latin, sand). A term specially applied to the sanded circular space reserved for gladiatorial combats in the centre of the ancient Roman amphitheatre. It is also used generally for any space or enclosure in which public contests are held, and figuratively for the scene of action of political or other struggles. The sand on these arenas was intended to prevent the combatants from slipping. See Amphitheatre; Circus.

Arenaceous Deposits (Latin *arena*, sand). Sedimentary rocks formed of relatively coarse detrital material. They are so called in contradistinction to argillaceous or clayey deposits, and include conglomerates, grits, sandstones, gravels, and sands.

Arenberg OR AREMBERG. Duchy of the Holy Roman Empire. It lay between Jülich and Cologne, to the west of the river Rhine. As a separate district Arenberg appeared in the 12th century or earlier. One of its lords was made a prince of the empire and another a duke. The Napoleonic cataclysm led to the disappearance of the duchy as a semi-independent state after the congress of Vienna. The title and valuable estates, however, were retained, and there was a duke of Arenberg in 1939.

Arenicola (Lat. *arena*, sand; *colere*, to inhabit). Generic name of the lob-worm. Common on all sandy shores, where its castings may be seen at low tide, this worm is used as bait.

Arenig Series. Lowest major subdivision of the Ordovician system of rocks. It is named after Mt. Arenig in N. Wales, where the rocks are well developed. It is



Areca catechu, the Indian palm which produces the betel-nut and catechu

composed mainly of grits and dark shales, which yield a highly characteristic fauna of graptolites and trilobites. Rocks of this age occur in Western Europe, Bohemia, the Eastern U.S.A., Canada, Australia, and New Zealand. In Britain the Arenig was a period of widespread volcanic activity.

Arensburg (Est. Kuressaare). Swedish and more familiar name of a fortified port of Estonia S.S.R. It stands on the S. coast of Oesel, in the Baltic Sea, has a large and deep harbour, and is an important commercial centre. It imports coal and skins, and exports timber. Arensburg became an Estonian town when Oesel was given up by Russia in 1919. By the pact of Sept. 28, 1939, the U.S.S.R. was allowed to establish a military base here. Captured by the Germans in 1941, Arensburg was retaken by the Russians Oct. 7, 1944.

Arensky, ANTON STEPANOVICH (1861-1906). Russian composer. Born at Novgorod, Aug. 11, 1861, he studied with Zikhe, and with Rimsky-Korsakov at the St. Petersburg conservatorium. In 1882 he became professor at Moscow conservatorium, and was director of music in the Imperial

Chapel, St. Petersburg, 1894-1901. He died in Finland, Feb. 25, 1906. His works include several operas.

Areois. Secret society formerly widespread in Polynesia. Mentioned by Captain Cook, and investigated by Ellis, this institution, fully developed in Tahiti and the Marquesas, extended to Hawaii and elsewhere. Tahiti had six lodges, adjacent islands six more, each with a grand master and seven or nine degrees, with distinctive tattooing. The initiate began by mastering the songs and dances. Membership was highly prized, and continued after death. Women held a communal position; infanticide, due to economic pressure, was characteristic of the general social custom of the time. The fraternity came in, as a puberty institution, with an immigrant people from the west, who practised sun-worship and were probably the megalithic builders. From a semi-sacred organization it degenerated into a professional dramatic troupe, long hostile to Christian missions, and now extinct. See Secret Societies.

Areopagitica. Prose tract by Milton. Further described as a speech for the liberty of unlicensed printing, it was published Nov. 24, 1644. It is doubtful whether Milton took the title from the oration of Isocrates, so named, or derived it from the Areopagus. It is regarded as one of the finest pieces of English prose ever written. There are good editions of the treatise by James Russell Lowell, 1890, J. W. Hales, 1898, C. E. Vaughan, 1900, and R. C. Jebb, 1918. See Milton, John.

Areopagus (Gr., Hill of Arēs). Hill in Athens, W. of the Acropolis, on which stood a temple to Arēs. It was the meeting-place of the famous council of the Areopagus, an assembly of elders drawn exclusively from the noble classes. Originally the governing body of Athens, its powers were limited by the constitution of Solon, later by that of Cleisthenes, and further reduced by Ephialtes in 462 B.C. Aeschylus, in his treatment of the story of Orestes, makes Orestes, when pursued by the Furies for the murder of his mother, appear before the Areopagus to submit his case to their judgement. It is a disputed point whether S. Paul delivered his speech (Acts 17) before the court itself, which was still in existence, or from the hill. See Athens.

Arequipa. Variant name of a volcanic mt. in the Peruvian Andes, known also as El Misti (*q.v.*).

Arequipa. A maritime department of S. Peru. Mountainous, with many fertile valleys, it has an area of 21,947 sq. m., produces cotton, wheat, rice, and sugar, and has valuable gold, silver, and borax deposits. Arequipa is the capital. Pop. 263,077.

Arequipa. A city of Peru. The capital of Arequipa department, and the third city of Peru, it is 107 m. by rly. N.N.E. of Molendo, its port, and stands on the Rio Chile, 7,750 ft. high, at the foot of El Misti volcano. It is the seat of a bishop, and possesses a handsome cathedral, several large churches, and a university. Its main industries are canning, brewing, and the making of candles, soap, and leather. It exports wool, borax, and gold and silver ores. It was founded in 1540 by Pizarro.

It has suffered severely from earthquakes, those in 1600 and 1868 causing great destruction and loss of life. Near are hot mineral springs and an observatory founded by Harvard university. Pop. 46,000.

Arēs. In Greek mythology, the god of war, identified by the Romans with the old Sabine deity Mars. Arēs was the son of Zeus and Hera, and the lover of Aphrodite, with whom he was detected in adultery by her husband Hephaestus (Vulcan). In the struggle between Zeus and the Titans he was kept prisoner in Hades for 15 months by the giants Otus and Ephialtes. During the Trojan War he sometimes took the field on behalf of the Trojans; on one occasion he was driven off, wounded and discomfited, by Athena and the Greek hero Diomedes. He had a temple on the Areopagus, where, according to the legend, he was tried on the charge of putting to death a son of Poseidon, but was acquitted. The original home of his worship is supposed by some to have been Thrace, by others Boeotia. See Mars; Mythology.

Aretaeus. Greek physician and writer on medicine. He probably lived in the 1st century A.D., and was the author of treatises, most of which are extant, on diseases and their remedies.

Arethusa. In Greek mythology, a nymph of Elis. While bathing she was seen and amorously pursued by the river god Alpheus. At her entreaty Artemis changed her into a fountain which disappeared underground, rising again in the island of Ortygia, near Syracuse in Sicily. Alpheus is said to have mingled his stream with that of Arethusa, and it was popu-



Arequipa. The plaza, or great square, of the third city of Peru, founded by Pizarro in 1540

larly supposed that anything thrown into the river came up again at Ortygia. Shelley tells the story in his poem *Arethusa*.

Arethusa, H.M.S. The first ship of this name was the French *Arethuse*, captured in the English Channel by H.M.S. *Venas* in 1759. The well-known 18th century song about the *Arethusa* describes a later action (1788) of the same ship. The fourth of the name, laid down as a 50-gun frigate and launched in 1849, took part in the Crimea campaign, and was handed over in 1874 to become a training ship. For many years she was moored in the Thames off Greenwich, Kent, where thousands of boys of the Shaftesbury Homes (*q.v.*) received their training. In 1932 she was condemned by the Admiralty as unfit for further service. A four-masted barque, *Peking*, built 1911, was purchased and converted by the Shaftesbury Homes and inaugurated as the *Arethusa* training ship in 1933, with a new berth on the Medway, opposite Chatham Dockyard. During the Second Great War the government took over the ship.

The sixth *Arethusa*, launched 1913, was the first of her type of fast, lightly armoured cruisers, specially designed to operate against hostile destroyers. She was badly damaged in the battle

of Heligoland Bight, Aug. 28, 1914. She played a prominent part in the Dogger Bank battle of Jan. 24, 1915, but on Feb. 11, 1916, returning to Harwich from a North Sea patrol, she struck a mine, and became a total wreck.

The seventh *Arethusa* was a cruiser, built Jan., 1933-Feb., 1935, at a cost of £1,251,161. She had a displacement of 5,220 tons, and carried a complement of 250. Her armament, which was adequate to deal with raiders of armed mercantile type, included six 6-in. and eight 4-in. guns. She took part in the Norwegian campaign in 1940, and was present at the capture of the Altmark (*q.v.*). In 1942 she bombarded Rhodes, but was torpedoed at the end of that year. Having undergone repairs, she joined in the bombardment of the Normandy coast on D-day, June 6, 1944.

Aretinian Syllables. Names for the notes of the musical scale. The six syllables, to which a seventh was added, were first used by Guido d'Arezzo in the 11th century. They were derived from the first syllables of the lines of a hymn to S. John which happened to begin on successive notes of the ascending scale. The six syllables were *Ut, Re, Mi, Fa, Sol, La*, and to these was added *Si* for the seventh note. The complete stanza and notes of the hymn may be seen in Grove's Dictionary of Music and Musicians. See Tonic Sol-Fa.

Aretino, PIETRO (1492-1556). An Italian poet and wit. Born at Arezzo, Tuscany, and patronised by the Medicis, the emperor Charles V, and Francis I of France, he achieved notoriety as the author of 16 exceedingly licentious sonnets (*Sonetti Lussuriosi*). Such fame as remains to him he derives

from his letters, five comedies, and a tragedy, *Orazia*. He spent his last years at Venice.

Arezzo. Province of Tuscany, Italy. Mainly mountainous, it extends across the Apennines, and has an area of 1,274 sq. m. It produces cereals, oil, wine, and mulberries, and manufactures leather, woollens, and hats. An earthquake on April 26, 1917, caused considerable damage, the village of Monterchi being entirely destroyed.

Arezzo. Town of Italy. The capital of Arezzo province and an episc. see, it stands near the junction of the rivers Arno and Chiana, 54 m. by rly. S.E. of Florence. The ancient *Arretium*, its walls were built in 1320 and rebuilt 1541-68, and its citadel, constructed in 1502, was demolished by the French in 1800. The Gothic cathedral, begun in 1277, contains many fine sculptures and the tombs of Gregory X and Tarlati di Pietramala, the warlike bishop



Arezzo, Italy. The 11th century church of S. Maria della Pieve

of Arezzo. The chief industries are pottery, and silk and cloth manufactures. One of the twelve Etruscan cities and an important military position, it was allied to Rome in 310 B.C., was sacked and repopled by Sulla, and suffered in the Ghibelline-Guelfic contests.

Occupied by the Germans after the Italian armistice of 1943, the town was subjected to frequent Allied air attacks as a key centre of communications. At the end of June, 1944, British troops of the 8th army approached the town from the S., but Arezzo was defended for three weeks against Allied attacks before capitulating, July 16. Damage was heavy, especially round the rly. station, but churches were relatively undamaged. Paintings and valuable

ceramics were lost when the museum was hit by a bomb. Three famous palaces, the Pretorio, Comunale, and Albergotti, suffered, also an ancient amphitheatre. Pop. 60,284.

Argaeus, MOUNT (Turk. *Arjish Dag*). Extinct volcano and the loftiest summit in Asia Minor. It has two craters and is regarded as 11,480 ft. high: one estimate makes it nearly 2,000 ft. higher. On a spur of the Taurus range, a few miles from Kaisariyeh (Caesarea), it has not erupted for many centuries.



Argali. Wild sheep of the Altai Mountains

Argali. Wild sheep found in the Altai Mts. and on the steppes of Siberia. It is about the size of a small donkey, and has magnificent, closely ribbed horns, which form almost a complete circle. It is pale brown in colour with a white face, and in winter a large ruff of white hair develops round the neck. The argali is found at an altitude of from 3,000 ft. to 4,000 ft., the flocks keeping to the same feeding-ground from year to year. The flesh makes good mutton.

Argall, SIR SAMUEL (c. 1535-1628). An English adventurer. He went to Virginia in 1609, and in 1612 he abducted the Indian princess Pocahontas, and held her a willing prisoner as a means to secure peace with the Indians. He was deputy governor and admiral of Virginia, 1617-19, and served in an expedition against Algiers 1620. He was knighted in 1622, after returning to England.

Argand, ARMÉ (1755-1803). Swiss physician and chemist. In 1784 he invented the Argand lamp, in which combustion was much improved by the use of a cylindrical wick and the admittance of air to the central tube from below. This doubled the area of wick in contact with the air. A glass chimney was added to improve the draught. When William Murdock (*q.v.*) introduced gas lighting, he adopted Argand's principle for the burners.



Argand Burner



Pietro Aretino, Italian poet and wit
Titian. Pitti Gallery, Florence

Argao. Town of the Philippine Islands. It stands on the E. coast of Cebu, 36 m. S.S.W. of Cebu town, and was founded in 1608. The locality produces rice and sugar. Pop. 35,400.

Argaum OR **ARGAON.** Town in Berar, India, 31 m. N. of Akola. It is notable for the battle fought Nov. 28. 1803, between the British under General Wellesley, afterwards the duke of Wellington, and the troops of the Mahratta chieftains. The issue was for some time in doubt, but after fierce fighting the Mahrattas abandoned their guns and fled. The name Argaum means the city of wells.

Argelander, FRIEDRICH WILHELM AUGUST (1799-1875). German astronomer. He was born at Memel, March 22, 1799, studied law in Königsberg, but was induced by Bessel to devote himself to astronomy. In 1820 he became assistant at the Königsberg Observatory, in 1823 director of the observatory at Abo, and in 1828 professor at Helsingfors, to which city the Abo Observatory was transferred. In 1837 he was nominated professor-director of the new observatory at



F. W. A. Argelander,
German astronomer

Bonn, where his chief work was carried out. His survey of the northern heavens, known as the Bonn Durchmusterung or B.D., was a complete survey of the northern heavens mapped out into zones, extending from the north pole to two degrees S. of the equator. Argelander died at Bonn, Feb. 17, 1875. See *Durchmusterung*.

Argens, JEAN BAPTISTE DE BOYER, MARQUIS D' (1704-71). French philosophical writer. Born at Aix, Provence, and disinherited by his father, he retired to Holland. His writings attracted the notice of Frederick the Great, who invited him to Prussia and made him his chamberlain and director of the Academy. After twenty years, d'Argens fell out of favour and returned to Provence, where he died. In philosophy he was a moderate sceptic. He denied the freedom of the will and the existence of a soul-substance.

Argensola, BARTOLOMÉ LEONARDO DE (1562-1631). Spanish poet and historian. Born at Barbastro, Aragon, Aug. 26, 1562, and educated at the university of Huesca, he became chaplain to Maria of Austria, widow of the emperor Maximilian II. Attached

later to the suite of the count of Lemos, viceroy of Naples, he returned to Spain in 1616 and was made a canon of Saragossa, where he died Feb. 4, 1631. He left a continuation of Zurita's *Annals of Aragon*, a history of the conquest of the Molucca Islands, letters and satires, and poems (*Rimas*) which, published in 1634 with those of his brother, Lupericio,



B. L. de Argensola,
Spanish poet
Print in Bibliothèque
Nationale, Paris

caused their authors to be hailed as the Horaces of Spain.

Argensola, LUPERCIO LEONARDO DE (1559-1613). Spanish poet and dramatist. Born at Barbastro, Dec. 14, 1559, and educated at the universities of Huesca and Saragossa, he became secretary to Maria of Austria, chamberlain to the Archduke Albert, and historiographer royal of Aragon. His three tragedies, *Filís* (now lost), *Isabella*, and *Alexandra*, were praised by Cervantes.

Argenson, MARC RENÉ DE VOYER, MARQUIS D' (1652-1721). French official. Born at Venice, the son of a distinguished French advocate, he went to Paris in 1683, and was appointed lieutenant-general of the Paris police, under Louis XIV, in 1697. He filled this post for 21 years. In 1718 he was made president of the council of finance, but had to resign in 1720 on the collapse of John Law (*q.v.*). He was then made inspector-general of the French police. He died May 8, 1721.

Argenson, RENÉ LOUIS DE VOYER DE PAULMY, MARQUIS D' (1694-1757). French statesman. Elder son of the above, in 1719 he was made councillor of state, and in 1744 member of the council of finance and foreign minister. The friend of Voltaire and the philosophers, he endeavoured unsuccessfully to establish a European alliance of nations. He retired into private life in 1747, and was henceforth occupied with literary pursuits. He died Jan. 26, 1757.

Argenson, MARC PIERRE DE VOYER DE PAULMY, COMTE D' (1696-1764). French statesman. Younger son of the lieutenant-general of police, he was made councillor of state in 1724 and minister of war in 1743. He introduced important army reforms, and was present at the French victory at Fontenoy in 1745. He subsequently remodelled the French army on

Prussian lines. In 1757 he was banished from Paris at the instigation of Madame de Pompadour. The great French Encyclopédie was dedicated to him. He died in Paris, Aug. 22, 1764.

Argenson, MARC RENÉ MARIE DE VOYER DE PAULMY, MARQUIS D' (1771-1842). French soldier and politician. Son of the marquis de Voyer and grandson of the minister of war, he entered the army as an officer in 1789; he enthusiastically supported the Revolution, and was for a time aide-de-camp to Lafayette. In 1809 he was made prefect of Deux-Nèthes (Antwerp), and helped to drive the English from Walcheren. He was deputy for Belfort during the Hundred Days, and in 1830 represented Strasbourg as an advanced Radical. He died Aug. 1, 1842.

Argent (Fr., silver). In heraldry, one of the two metals, silver, also represented by white. It is shown in drawings by a plain surface. See *Tincture*.

Argentan. Town of France, in the department of Orne. It stands on the Orne, 31 m. by rly. N.W. of Alençon. Industries include lace making and horse raising. During the battles of 1944 heavy fighting developed around Argentan, which was reached by U.S. forces on Aug. 14. A large force of Germans, almost encircled, was making its escape through the Falaise "gap" between Alençon and Falaise. The gap was closed by the Allies and Argentan was captured Aug. 20.

Argentario. Mountainous peninsula of Italy. Situated in the S. of Tuscany, it is projected into the sea by two narrow strips of land, enclosing a lagoon and a headland on which stands the town of Orbetello. Its highest summit reaches 2,085 ft.

Argentera. Mt. of N.W. Italy, called fully the Punta dell' Argentera. The loftiest peak of the Maritime Alps (10,880 ft.), it is in Piedmont, S.W. of Cuneo and N. of Nice. First ascended in 1879.

Argenteuil. Town of France, in the department of Seine-et-Oise. It stands on the Seine, 7 m. N.N.W. of Paris, of which it is a suburb, and is chiefly noted for asparagus. Ironware and watches are manufactured. In its church is a garment said to be the seamless coat of Christ. Pop. 59,314.

Argentièrre, COL DE L'. Pass in the Maritime Alps. It is on the road from Barcelonnette, France, to Cuneo, Italy, and was crossed by Francis I and his army in 1515. It is 6,545 ft. high.

ARGENTINA: A VARIED AND WEALTHY LAND

C. B. ARLOW, Managing Editor, Latin-American World

The physical features, the political constitution, the people, the social and industrial life, and the arts of this vast and comparatively new country are here described in detail. See the articles on Buenos Aires and other towns and cities of the republic. For later history see N.V.

The name Argentina (Lat. *argentum*, silver) was given to the country by its Spanish conquerors. They first called the great estuary by which they approached Argentina the Mar Dulce, fresh-water sea, then the Rio de Solis, after the Spanish navigator, and, finally, as it is named today, the Rio de la Plata, or silver river.

PHYSICAL DESCRIPTION. Argentina is the second largest republic of Latin America both in area and in population. It extends from latitude 21° 40' S. to latitude 55° 5' S. at Cape San Pio. From N. to S. its length is about 2,150 m. and at its broadest part it is 980 m. wide. Excluding the coast line of the estuary of the river Plate, Argentina has a coast line of some 1,600 m.

In area the Argentine republic takes seventh place among the countries of the world, ranking after the U.S.S.R., Canada, Brazil, the U.S.A., Australia, and China. Compared with Europe, the republic comprises as large a space as the combined areas of Great Britain, Eire, Poland, Spain, Germany, Holland, France, Switzerland, Italy, and Belgium.

On its N. frontier Argentina has boundaries with Bolivia and Paraguay, on the E. with Brazil and Uruguay. The Cordillera of the Andes, which extends the whole length of the Argentine republic, separates it from Chile. The Tierra del Fuego (Land of Fire), an island which forms the "toe" of the continent, is separated from the mainland by the straits of Magellan. Tierra del Fuego consists of the Isla Grande and a group of smaller islands. Argentina owns less than half this territory, the rest belonging to Chile, but it owns the small Isla de los Estados which lies off its S.E. tip. Furious gales blow

around these islands, which are frequently bitterly cold and snow-bound.

The republic has five main natural divisions: (a) the Andine, which is the eastern slope of the Cordillera of the Andes, the Pre-Cordillera in the N.W.; (b) the Chaco; (c) the Mesopotamian, in the fork of the Paraná and Uruguay rivers; (d) the Pampan, which extends in a fanlike formation for 300-400 m. from Argentina's capital, Buenos Aires; and (e) the Patagonian, or southern plateau.

Through these five natural divisions the republic has zones ranging from tropical in the tropic of Capricorn, through subtropical and temperate, to the Antarctic land of Tierra del Fuego.

Apart from the river Plate, the chief rivers are the Paraná (2,000 m.) and the Uruguay, which both flow into the Plate estuary.

The chief mountain range is the Andine, which combines the E. and W. Cordillera separating Argentina from Chile. The Misiones range is on the N.E. boundary. The central mountain group is the Sierras of Córdoba, and the southern range, including the Sierras of Ventana and Tandil, is in the S. of the Buenos Aires prov. Aconcagua mountain, in the

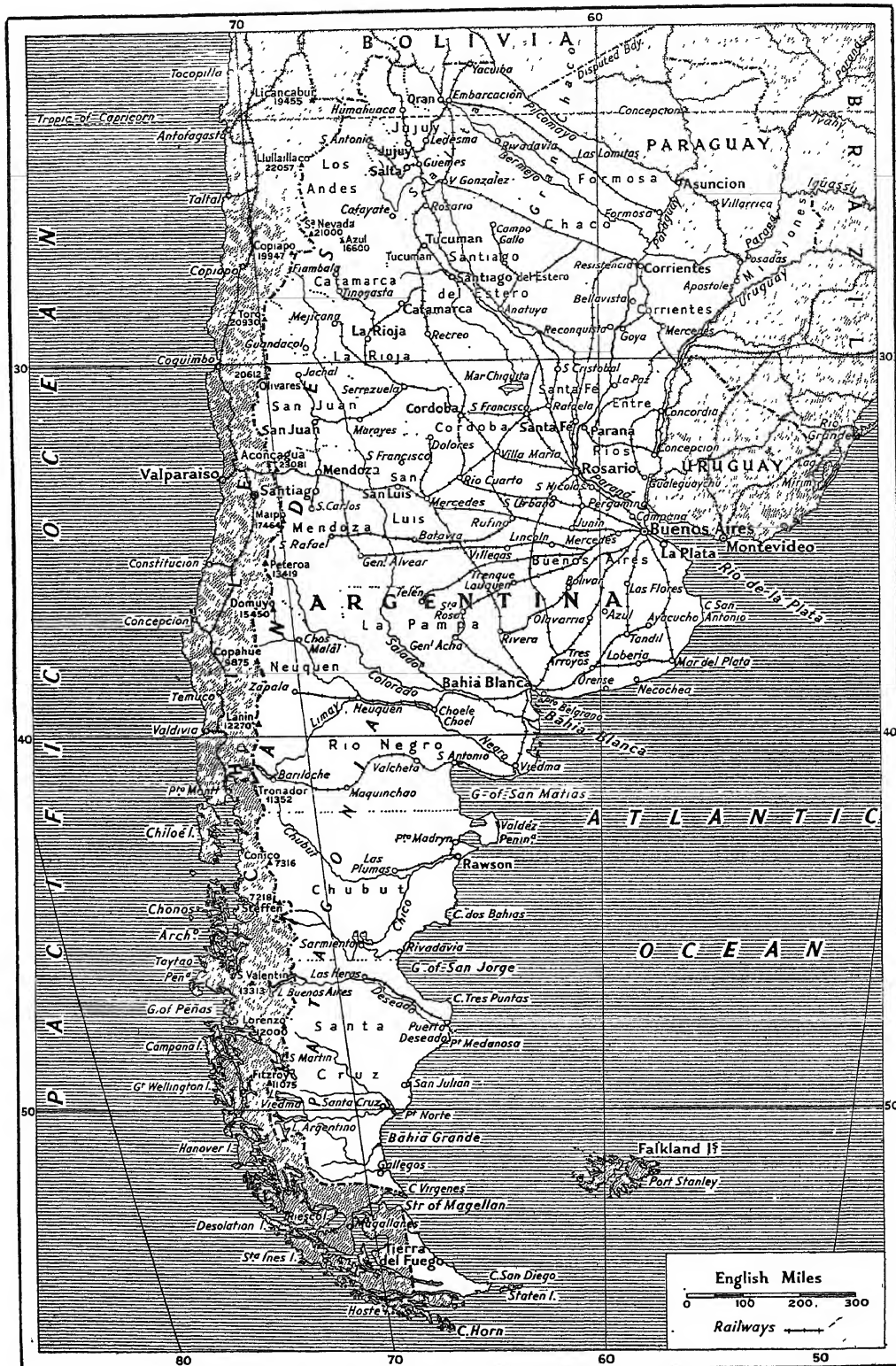
Andine range, with its 23,081 ft., is the highest in S. America.

The traveller by air from Argentina to Chile has an awe-inspiring journey across the Andine range. The mountains, snow-capped and majestic, stand out against the clear blue sky. At the frontier between the two republics on the Cumbre Pass is the gigantic Christus statue, which can be seen for miles. It was erected by the workers of the Argentine republic, and it bears the inscription: *Antes se reducirán a polvo estas montañas, que los pueblos de la Argentina y Chile rompan la paz que a los pies de Cristo Redentor juraron mantener* (Sooner shall these mountains crumble into dust than the peoples of Argentina and Chile break the peace which at the feet of Christ the Redeemer they have sworn to maintain).

In the Misiones region, near the junction of Argentina with Paraguay and Brazil, are the Iguazu waterfalls. The falls are part of the Iguazu river, which is a tributary of the Paraná, and they dash over a 200-ft. precipice on a frontage of about 2,600 yds. through some of the most beautiful scenery in the world. Virgin forest blazing with flowers and vegetation in the most vivid



Argentina. Majestic sweep of the great Cordillera of the Andes near the Argentine-Chilean frontier, between Mendoza and Santiago. Here runs the famous trans-Andine railway



ARGENTINA: MAP OF THE GREAT SOUTH AMERICAN REPUBLIC

colours, and countless butterflies. form their background.

The falls were first discovered by Alvar Núñez de Vaca as he travelled from Brazil to Asunción in Paraguay and he called them Salto de Santa María. In 1928 Argentina obtained possession of a large tract of land around the falls and this now constitutes the national park of the N.

POPULATION. A census taken in 1947 showed that the population was 16,104,929. The urban and rural pops. account respectively for 60 p.c. and 40 p.c. of the total. Of these 77.5 p.c. are Argentine citizens of European origin, 20 p.c. are foreigners (almost all Europeans), and 2.5 p.c. are of mixed European and native Indian blood. This last figure is gradually decreasing. The foreign-origin inhabitants are made up as follows:

Italians	930,000
Spaniards	830,000
Russians	94,000
Uruguayans	86,000
French	80,000
Turks	65,000
British	50,000
Germans	27,000
Other countries	460,000

The principal towns are the capital Buenos Aires; Rosario in Santa Fé prov., where agricultural produce of the northern and central provs. is shipped for export, being sent down the Paraná river to Buenos Aires for trans-shipment to larger vessels; and Córdoba, a centre of learning and culture.

The Argentinian is different from all other Latin Americans in many respects. The Indian, or *mestizo*, pop. is very small, Argentina having the largest white population in Latin America. All the Latin-American countries are nationalistic, but Argentina is probably the most markedly so. Even matchboxes and other domestic goods have patriotic slogans on them. There is an annual "Día de la bandera" (festival of the flag), a public holiday (June 20) on which all the people pay tribute to the blue and white Argentine flag.

In a continent where *mañana* (tomorrow) is the pivotal word the Argentinian stands out. He is a hard worker who lets nothing stop him in his efforts to get what he wants. He pays great attention to the power of money, but is generous when he has it. He is cultured, all his culture being derived from his European ancestry, French influence predominat-

ing. The Second Great War, however, had an effect on this. France and other European countries were for the most part cut off from Latin America, and where formerly the Argentinian would think of reading everything in French, he now reads his classics in Spanish and increasingly in English. The educated Argentine woman, not having entered into the business world to any notable extent, has more leisure in which to devote herself to the arts. The townswomen of Argentina followed French influence in dress, and today the women in Buenos Aires are among the smartest and best-dressed in the world.

It is the blood of the early European adventurers that has given Argentina its character. The Spanish conquerors never met the indigenous races of Latin America as their equals, and in the zones where the climate was most like Europe they soon overcame the natives. There was some intermarriage between the white conquerors and the copper-coloured natives, but in a very short time the half-breeds born from these marriages yielded pride of place to the pure white stock.

National Dishes

The Argentinian has a great zest for life, and with his nationalistic pride running high is always keen to know what the rest of the world is thinking of his country. A European visiting Argentina is struck by the excellence of the food, by the high standard of cooking, and by the large portions which are always served. As can be expected from so vast a land of agricultural products, butter and beef are a large part of the diet. A workman will have for his breakfast a *bife*, a delicious steak the size of his plate. *Puchero* is another national dish. To liken it to the English stew is misleading, for while it is a stew it is like no other in the world. It is served with every imaginable kind of vegetable, including both sweet and ordinary potatoes, and needs an enormous plate to hold it. A distinguished visitor to Argentina will be given an *asado criollo*, or peasant roast. *Asados* are generally given at the usual dining hour—10 p.m. or later. An animal is roasted whole on a spit in the open air, and on the bars which are put across the open fire are cooked the sausages and offal. Helping after helping is given the guests, and it is considered bad form to refuse to eat

any of the courses. Argentine wines are served during the *asado*, which goes on for several hours.

Away from cosmopolitan Buenos Aires is The Camp, or pampa, the treeless plain which stretches from the Atlantic coast to the Andes, and which in the early days was in the hands of the Indians. With the dispersal of the Indian the pampa was peopled by the *gauchos*, and it was not until the end of the 19th century that immigrants now coming into the country on a large scale gradually took it over and developed it into the wealthy agricultural region it is today. Its grain-growing and cattle-raising industries are now among the first in the world. Scientific methods have been adopted, and machinery now helps the farmer and the *estanciero* to get the maximum from the land. *Estancias* (ranches) stretch for miles, and some of their owners are very wealthy. About 75 p.c. of the *peones* or labourers now live on the *estancias* in modern workmen's dwelling-houses owned by their employers. Their rates of pay are government-controlled. Much of the land is owned by individual landowners, whose names, although they are all Argentine citizens, show their European ancestry.

COMMUNICATIONS, ETC. From the days of Pitt and Canning, Great Britain has helped Argentina to prosperity. British men were responsible for the building of the republic's rlys. and of the total rly. mileage more than half was, until 1948, British-owned. The first rly. was built in 1857. Britons built the roads of Argentina; and sold to her agricultural machinery, and the finest pedigree stock which was the basis of her flourishing meat trade.

The rly. systems are among the finest in Latin America. On Mar. 1, 1948, Argentina became sole owner of her whole rly. system, consisting of 18 rlys., amounting to a total track length of 26,568 m. Of these she purchased at a total overall cost of £8,707 per mile the 8 British-owned rlys., renaming them after national heroes, e.g. the Buenos Aires Great Southern rly. becoming the General Roca. Argentina had already purchased the 3 French-owned lines in 1947. Four of the largest systems, including the General Roca, have the broad gauge of 5 ft. 6 ins.; three other gauges are found in the rest of the rly. system. Although Argentina is 23 times the size of England, it is possible to travel to

all her large towns by rly., and there are good express services to neighbouring countries. A line from Salta to Antofagasta, Chile, begun 1922, was opened in 1948.

Water transport is considerable. Large steamers cross the river Plate to Uruguay and ply up the rivers Paraná and Uruguay to Asunción in Paraguay, where it is possible to trans-ship to a small vessel which goes on to Corumbá in Brazil. There are also services to Porto Mendes in Brazil via Puerto Aguirre on the Upper Paraná R. Much of the shipping is nationally owned.

Although there are good macadam and bitumen roads linking the capital with Mar del Plata (the Argentine "Brighton") and with Rosario and Córdoba, most of the roads leave much to be desired when it is necessary to get quickly from one town to another. However, new national roads (part of the 1942-47 plan) have helped to speed motor transport between the various provinces. The four main roads making up that part of the Pan-American Highway (g.v.) in Argentina were opened to traffic in 1942.

Air Communications

Pan-American Airways operates services to Uruguay, Brazil, and all countries on the east coast as far north as Miami, U.S.A.; and two services to Chile and all countries on the west coast to Miami. British Overseas Airways Corporation, which connects Buenos Aires with London, also extends to Santiago in Chile. Air France has a line from Paris to Santiago.

Numerous air lines serve Argentina internally; originating as private companies, they were nationalised May 5, 1949. The F.A.M.A. (Flota Aerea Mercante Argentina), also nationalised, connects Buenos Aires with London. Other Argentine services operate to and from the chief cities of Uruguay.

Argentina's ports, the chief ones being Buenos Aires, Rosario, and Bahia Blanca, handle the cargoes of about 65,000 ships every year.

Transport within the towns is by tramway and a small type of motor bus called a *colectivo* and holding about a dozen passengers. Argentina had been one of the few Latin-American countries to keep traffic on the left of the road, but in 1945 *cambio de mano*, or right-hand driving, was enforced.

An efficient telephone system is run by the government, the automatic system being installed in the larger towns. The cable com-

panies, run by private enterprise, are the Western Telegraph Company and the All America Cables. There are 42 radio stations which rely for their revenue on commercial broadcasting. The post office is state-controlled.

GOVERNMENT, ETC. Argentina has a written constitution, dating from 1853 and several times revised. A federal government rules the entire republic, but 14 provinces or states have their own autonomous governments: Buenos Aires, Santa Fé, Córdoba, Entre Rios, Corrientes, San Luis, Mendoza, San Juan, Tucumán, Santiago del Estero, La Rioja, Catamarca, Salta, and Jujuy. In addition there are nine national territories administered by governors appointed by the president, and these are under the direct control of the Federal government: El Chaco, La Pampa, Misiones, Chubut, Neuquén, Santa Cruz, Rio Negro, Tierra del Fuego, and Formosa, and the military zone of Comodoro Rivadavia (until 1946 part of Chubut).

Under the revised constitution of 1949 the president, who is elected for six years, became eligible for a second term (instead of one only), his election being by direct vote instead of as previously by an electoral college similar to that of the U.S.A.; the term of the 30 senators was reduced from nine to six years, that of the 158 representatives increased from four to six years, a part of both the chamber and the senate being elected every three years. The cabinet, chosen by the president, was increased from eight members to 20.

The seat of the federal government is in Buenos Aires.

There is a supreme court and subsidiary tribunals in all the provinces. There is a civil code. The federal government decides questions of foreign affairs, defence, higher education, currency, customs, inter-provincial communications, trade, and postal services.

In any case involving foreigners, or where national laws may be invoked, the supreme court has jurisdiction. Although the commercial and penal civil codes are of national scope, in normal cases they are enforced by the provincial courts. The provinces are politically self-governing and possess legislative and judicial authority on all matters not covered by the federal government.

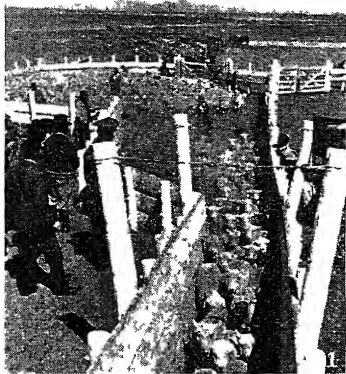
Roque Saenz Peña, a Conservative president elected in 1910, reformed the election laws, extended the suffrage to all men over 21,

and brought in the secret ballot. Women were enfranchised Sept. 9, 1947.

Illiteracy steadily decreased with the introduction of free and compulsory primary education (which is also secular), 22 p.c. of voters being illiterate in 1930 compared with 35 p.c. in 1916. There are some 15,000 primary and 1,000 secondary schools, the first ranging from large well furnished schools in the towns to small wooden buildings in the country districts. In 1946 there were nearly a quarter of a million pupils attending secondary schools, staffed by 28,360 teachers. The oldest university, founded in 1613, is at Córdoba. Other universities are at Buenos Aires, Tucumán, La Plata, plus the national universities of El Litoral and Cuyo. These universities have earned high standing in Latin America and are well endowed with up-to-date laboratories and specialised libraries. There are also schools for industrial training, arts and crafts, commercial training, rural economy, and for teachers. Other institutes exist in the large towns where advanced instruction is given in the fine arts, decorative arts, and music. The ministry of agriculture has provided a number of rural schools where practical agriculture is taught. The school children all wear the same uniform; a white overall covers their suits and dresses, and at leaving hours they throng the streets looking like a young army.

System of Finance

The financial structure is controlled by the Central Bank which, while free from government control (the government cannot demand loans amounting to more than 10 per cent of the average national budget receipts for the previous three years), is legally obliged to act as a centralising institution for all the financial affairs of the nation. The monetary system, by virtue of a law of 1881, is based on the *peso oro* or gold dollar of 1.6129 grams of a standard of 9/10 of fine gold. This *peso oro* is divided into 100 *centavos*. Depreciation and fluctuation of the notes representing the *peso oro* led to the law of 1899, under which the value of the notes in circulation was fixed at 44 *centavos* of the *peso oro*, and thus a system of exchange was established at this rate of 44 to 100 for delivery of gold against notes and vice versa. For domestic transactions, therefore, the paper dollar is legal. At the 1946



1. Herd from a sheep-run being driven through a boarded lane into the sheep train. 2. Wool wagons in Chubut. 3. Cattle on the pampa. 4. Inspecting meat for export in a frigorifico. 5. Packing grapes for export.

6 Extensive plantation of mandarin orange-trees and vines. 7. Part of a prosperous lakeside farm in the Territory of the Rio Negro, S. Argentina. in the background can be seen the great range of the Andes

ARGENTINA: PRODUCE OF RANCH AND PLANTATION IN THIS LAND OF PLENTY
 Photos, 1 and 2, Dorier Leigh; 3, E N A , 4, 5, 6, Argentine Ministry of Agriculture

rate of exchange, sixteen paper dollars equalled £1 sterling.

RELIGION. Argentina is a Roman Catholic country, but there is complete freedom of religion, churches of other denominations being allowed. The government, although giving financial help to the church, does not interfere with its religious instruction. Most of the priests are of Spanish or Italian origin. Religious festivals are celebrated as national holidays. During the carnival (Shrove Tuesday) the main streets in the capital and large towns are hung with coloured lights, and young people wear fancy dress.

PRODUCTS. Argentina, with rich soil and verdant pasturelands, has as her chief industries agriculture and cattle-raising. More than 90 p.c. of her exports are of agricultural or animal origin, and these industries provide the livelihood of about 70 p.c. of the people. Of her 697,000,000 acres of land, 272,000,000 acres are suitable for agriculture and stock-raising, 200,000,000 acres of arable land are especially suitable for grain-growing, 125,000,000 acres are hills and woodlands, and 100,000,000 acres are unproductive land. This latter figure includes the built-up areas of towns.

Although much of the land which could be made suitable for grain-growing has not yet been cultivated, Argentina is none the less the chief exporter of maize and linseed in the world. In production of maize she is, however, second to the U.S.A., but of linseed she produces four-fifths of the world's supply. The grain-growing districts are the plains of the central and eastern regions, stretching in a crescent for about 600 m. from Santa Fé in the N. to Bahia Blanca in the S.

Varieties of Maize

Argentine maize is used for feeding cattle, horses, poultry, and pigs, also for industrial purposes. To a much smaller extent it is used for human consumption. Flint maize, which is exported, is sub-divided into three categories: cinquantine maize, a small-grain seed used for feeding birds; yellow maize, used in producing cornflour for human consumption in some countries; and red maize, which is exported to the British market as "yellow plate maize," to be used for stockfeeding and industrial purposes. It is used in the production of alcohol, whisky, and glucose.

Exports of linseed account for about 13 p.c. of the republic's

total exports, and in normal years 1,650,000 tons, accounting for nine-tenths of her total crop, are shipped. The seed is crushed, linseed cakes being used for cattle-feeding, and the linseed oil going into use in industry.

Owing to changing weather conditions and the wide area in which it grows, Argentine wheat is difficult to classify. The acreage planted with wheat fluctuates more than for any other grain crops. In 1929, 23,000,000 acres of wheat were planted, but with the fall in prices due to the world depression of 1930-31 less and less was grown until in 1935-36 only 14,000,000 acres were planted. Since that time the wheat acreage planted has averaged 18,000,000. About half the republic's oats crop, grown in the south of the Buenos Aires prov., is exported. This is about 400,000 tons, mainly used for animal fodder.

An invisible export is the alfalfa plant, which grows in the humid pampa districts, and provides a great part of the cattle food. About 15,000,000 acres grow it to the exclusion of any other crop, and it is generally cut about six times a year.

Livestock and Meat Industries

Argentina is the world's leading producer of beef; some 90 p.c. of her production is consumed at home. From original British pedigree stock, Argentina has gradually increased her cattle until today it is estimated she has more than 32,000,000 head of cattle. Livestock breeders visit every British cattle show, and always buy the best stock for shipment to Argentina. Thus the quality of meat is kept at the highest standard. In Buenos Aires each year is held the Palermo cattle show at which all the rich *estancieros* (ranch owners) bid for the first-class cattle exhibited. The meat industry is now a highly scientific one and animals are graded and classified from the moment of their birth up to the time they are shipped as beef. Breeding farms are used where all the cows are served by purebred bulls. After birth the calves are sent to fattening farms, which are generally situated in the alfalfa growing districts. Only steers are used for export to Great Britain, and they are first sent for fattening to the best pasturelands. The *frigorificos*, or packing houses, buy their steers direct from the *estancias* when they are about twenty months old. The average weight of the steer

is below 1,100 lb., the maximum export weight.

The beef is exported in three forms, chilled, frozen, and tinned. The chilled beef is brought to England in refrigerated ships and is kept just above freezing point so that it will keep fresh but will not freeze hard. It should be eaten within 40 days from the day of killing. The frozen beef is generally of a cheaper quality, and will keep an indefinite period, for it comes to England frozen solid. The tinned meat is the variety known as corned beef, and all processes in its making, including sterilisation with the tins hermetically sealed, take place in the *frigorifico*. During the Second Great War the Argentine *frigorificos* sent millions of tins of special meat and dehydrated meat for the armed forces in Europe and the Far East. The ten largest *frigorificos* in Argentina, which are state-controlled, are capable of slaughtering 5,000 steers, 10,000 sheep, and 1,000 pigs in an eight-hour day.

Among the world's sheep-breeding countries Argentina stands third, coming after Australia and the U.S.A. This gives her a large and important wool-exporting industry, about 300,000,000 lb. annually. Merino, fine crossbred, and medium crossbred are the main types exported. The U.S.A. is the republic's best customer for wool, although some European countries also import it. Her enormous livestock industry makes Argentina one of the chief hide-exporting countries in the world. Most of the hides are part-salted and dried before export, and the tanning is generally done in the country importing them.

Dairy Products

The dairy industry, although not started until the end of the 19th century, is of considerable size. Butter and eggs are exported to Europe and to the U.S.A., but all the cheese produced is consumed within the republic. Lactic casein, a by-product of butter-making, is used in the manufacture of gum and for paper glazing. Argentina is the world's chief exporter of this. Before the Second Great War Germany was her chief customer, but now Great Britain comes first.

The fruit-growing district of Bahia Blanca has developed rapidly, and with the aid of an up-to-date method of packing, grading, and refrigeration, combined with the excellent growing qualities of the soil, Argentina has found an

increasing market in Europe. Apples, pears, and grapes are the principal fruits exported, Brazil being her first customer, with Great Britain second.

Wines of the Country

Wine making in the Mendoza district is an industry that has been rapidly improved. The Argentine vintners called in French experts for advice. Although some brands are excellent when drunk in Argentina, they are not at the stage where they will "carry" altogether satisfactorily, but wines have been added to the country's list of exports.

Other products are sugar cane (annual production 433,000 tons), pea-nut oil, tobacco, and yerba maté. The latter is a beverage which can be likened to green tea, but it has a recognizable flavour of its own. It is drunk by every one on the *estancias*, and is sucked through a silver or cane tube called a *bombilla* from a small, narrow-necked gourd.

Mineral resources are poor. The only one exploited, and then in small quantities, is petroleum, found in Comodoro Rivadavia and Neuquén in the S., Mendoza in the W. of the central region, and Salta in the N.

INDUSTRIES. During the Second Great War Argentina's manufacturing industries grew enormously, and now the country is self-sufficient in many of the consumer goods she previously imported from Europe and the U.S.A. Production of confectionery has grown and is first-class. Progress in the glass industry has been phenomenal, and factories now make window-glass, all of which was imported before 1939. The production and quality of glass household goods and ornaments have been markedly improved. Shoe factories, soap-making and toilet goods, turnery, electrical fittings, cardboard boxmaking, pneumatic tyres, paper-making, and tanning have become flourishing national industries. Yet Argentina is to some extent an importing nation. During the first six months of 1945 the total value of her imports, in paper pesos, was 466,984,715. Total tonnage imported in that period was 1,855,930, as compared with 2,863,256 tons exported, to the value of 988,354,066 paper pesos.

HISTORY. Before the conquest of Argentina by the Spaniards in the 16th century the Indian tribes, the Diaguites or Calchaquis, lived in stone villages and depended on agriculture for their existence.

The high culture of the Incas did not reach Argentina except for a small part of the N.W. territory, where the tribes are now extinct. The tribes of the wooded Chaco—the present-day land of the republic's Indian population—lived by hunting and fishing. The tribes that lived on the southern pampa hunted the wild llama in small independent parties. It is believed in some quarters that these Indians superseded a people of a higher culture, and this theory is given weight by paintings showing ritualistic and hunting scenes in bright colours which were found in caves in the Patagonian district of Puerto Gallegos. These later Indians were a tall, well-built people and they quickly learned to ride the horses which the Spaniards brought with them to the country. Despite frequent wars with the Spaniards, for many years these tribes roamed the southern part of the country and it was not until the year 1881 that the Spaniards finally drove them from the country and opened Patagonia to white settlers.

In 1515 the Spanish sailor Juan Diaz de Solis entered the river Plate and anchored off a small island which he called Martín García after one of his officers. De Solis was killed by the Indians and his expedition returned to Spain. In 1519 a Portuguese adventurer, Ferdinand Magellan, working for the Spanish crown, sailed up the Plate, hoping to find that it opened into the Pacific. He soon decided, however, that this was not so, and, retracing his way, he went southward on the journey down the coast of S. America. It was from this expedition that the straits of Magellan took their name.

Sixteenth Century Explorers

Sebastian Cabot left Spain in 1526 with the intention of following the journey taken by de Solis in 1515, but instead of anchoring at Martín García he continued up the river Paraná. The Indians greeted this expedition with pleasure, showering gifts on its members. Cabot, however, after quarrelling with Diego García, a member of the ill-fated de Solis expedition, who had followed him to the river Plate, returned to Spain after leaving a small settlement called Espíritu Santo. But soon after he left its members were massacred by the Indians, and it was nine years later, in 1535, that the King of Spain arranged with Pedro de Mendoza, a Spanish nobleman, for another expedition

to go out under his leadership with the object of obtaining a permanent Spanish colony on the lands of the Plate. This he did, and he was the man who gave the Argentine capital its present name. Santa María de los Buenos Aires (S. Mary of the Good Winds), after the patroness of sailors. After a few months trouble broke out with the Indians and the settlement had to be abandoned.

Rise of the Republic

Argentina first broke away from Spanish control in 1810 and began her independence movement. On July 9, 1816, after much fighting, the formal declaration of independence was made at Tucumán.

Among many notable presidents, Bernardino Rivadavia, president in 1826, did much to further the republic's development; he founded banks, a currency system, and schools, and established commercial treaties with the U.K. During his presidency Argentina went to the aid of Uruguay in a three-year war to push the Brazilians back from the River Plate territory. This war was successful.

The first constitutional president of the republic (constitution signed May 1, 1853) was Gen. Bartolomé Mitre; he was followed by Domingo Faustino Sarmiento. Under the guidance of these two statesmen the republic made great progress. There was then a period of internal troubles which ended with the subduing of the Indian population by Col. Roca, minister of war, who afterwards became president. It was during his regime that British capital poured into the republic. Since then Argentina, like most new countries, has had turbulent times, but the republic's material progress has been phenomenal.

During the Second Great War Argentina was the subject of world-wide comment because of her neutrality, coupled with the emergence of an authoritarian regime. Although most of the comment was adverse, there was a school of thought which contended that by not joining the United Nations Argentina was better able to supply the enormous amount of foodstuffs she sent to Europe and the East.

Traditionally, the two main political parties are Radicals and Conservatives. But these were overwhelmed in the establishment of dictatorships (see N.V.).

LANGUAGE AND LITERATURE. Like the rest of Latin America, except Brazil where the language is Portuguese, the people of

Argentina speak Spanish. But naturally in a continent the size of Latin America, there are many variations in the types of Spanish spoken, and the Argentine variety, judged by Castilian standard, is poor. Argentina is notable for its pronunciation of the "ll." In Spain and in the more northern Latin-American countries, for instance, the pronunciation of the word for street, *calle*, is "cahye," whereas in Argentina it is pronounced "cahje." As is to be expected in a land where the population is made up of all European races, many words not used in any other Latin-American republic have crept by common usage into the Argentine variety of Spanish.

Poets and Novelists

Argentine literature has been prolific and varied, and all aspects of Argentine life have provided subjects for writers. Outstanding names in its literature and intellectual life during the past hundred years are: Esteban Echeverría (1805-1851), a romantic poet whose greatest work was *La Cautiva*, 1837; José Mármot (1818-1881), author of the famous novel *Amalia*; Bartolomé Mitre (1821-1906), journalist (founder of the daily newspaper *La Nación*) and poet of nature, and also one of the leading historians of S. America; Juan Bautista Alberdi (1810-1884), diplomat, journalist, and prolific writer of prose; Domingo Faustino Sarmiento, statesman, educator, poet, and author of *Facundo*, a famous socio-political biography of the lieutenant of the dictator Rosas; José Hernández (1834-1886), who wrote *Martin Fierro*, the great book of primitive *gaucho* (cowboy) life in Argentina, its place in Argentine literature being almost comparable to those of the Bible and Shakespeare; Estanislao del Campo (1835-1880), who wrote a famous burlesque poem, *Fausto*, in *gaucho* dialect; and Ruben Dario (1867-1916), famous as a poet throughout Latin America, who spent most of his life in Argentina, though born in Nicaragua.

In the 20th century the best-known Argentine novelist is Hugo Wast (Gustavo Martínez Zuvirria), whose popular novels have been translated into many languages. The greatest poet, essayist, and publicist was Leopoldo Lugones. A novelist and historian who has been honoured by foreign universities and whose works have been translated into many languages is Ricardo Rojas. A poetess of outstanding merit was Alfonsina

Storni. An Argentine academy of letters, founded 1921, has a membership limited to twenty.

The two newspapers *La Prensa* and *La Nación* compare favourably with any in the world. *La Prensa*, known for its high literary and cultural standards, is still owned by the family of the founder, José C. Paz, who started it in 1869. *La Nación*, a paper with a strong Catholic policy, was founded in 1870 by Bartolomé Mitre (q.v.), president 1862-68, and is still controlled by the Mitre family.

Music. During the 19th century native music was mostly confined to folk dances, including the *pericón*, a native country dance, and the tango. However, the ever-growing number of European musicians who have visited Argentina have helped to create a local school of music. The best known composers are Julian Aguirre (d. 1935) and Alberto Williams (b. 1862), the "grand old man" of Argentine music.

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Argentina, LA (1890-1936). Spanish-American dancer, whose real name was Antonia Merée. Born in Buenos Aires, Sept. 4, 1890, she went to Spain at the age of two with her parents, who became members of the company of the Madrid Royal Opera House.



Argentina, Spanish dancer famed for the precision of her footwork and spirited playing of the castanets

Argentina joined the company at the age of five. At eleven she was a première danseuse. Later, moving to Paris, she became internationally famous. Her performances of Spanish dances and her playing of the castanets were unrivalled. She toured Europe and America appearing regularly in London from 1931, where her *Danse Rituelle du Feu* became specially popular. She died at Bayonne, July 18, 1936.

Argentine Pass.

Depression in the Rocky Mts. In the state of Colorado, U.S.A., not far from Denver, it is just over 13,000 ft. in height, and is among the highest wagon roads in the world.

Argentite. One of the principal ores of silver. It is the source from which much of the silver is obtained in the mines of Germany, Bohemia, Hungary, Mexico, and Nevada. A sulphide, it has a composition of about 86.5 p.c. silver and 13.5 sulphur. It is always found combined with other sulphides, particularly those of copper and lead. See Silver.

Argentoratium. Latin name for Strasbourg. It was used by the early printers. Most of the books printed at Strasbourg in the 15th, 16th, and 17th centuries bear the impress *Argentoratium*. See Strasbourg.

Argesul, ARGESH, ARJISH, OR ARJESHU. River of Rumania. Rising in the Transylvanian Alps, it flows for 150 m. S. and S.E. to the Danube below Oltenitsa.

Argesul, BATTLE OF THE. Battle fought Nov. 30-Dec. 3, 1916, between the Austro-Germans under Falkenhayn and Mackensen and the Rumanians under Avarescu. It resulted in a heavy defeat for the Rumanians and the evacuation by them of their capital Bukarest, which was occupied by Mackensen on Dec. 6. See Rumania.

Arghana Maden. Town of Turkey, in Elazig vilayet. On the river Tigris, 50 m. N.W. of Diarbekir, it has an old and very rich copper mine.

Argives (Greek *Argeioi*; Lat. *Argivi*). Inhabitants of Argos in Greece. Homer uses the term for the Greeks in general. See Argos.

Argob. Hebrew name for the district containing threescore cities ruled by Og king of Bashan (Deut. 3; 1 Kings 4). Called by the Greeks Trachonitis (Luke 3), it is usually identified with the modern El Lejah. Described as an ocean of basaltic rocks and boulders, it is studded with deserted towns and ancient villages. See Palestine.

Argol. Crude acid potassium tartrate deposited from wine. When grape juice ferments the acid potassium tartrate ($\text{KHC}_4\text{H}_4\text{O}_6$), which it contains naturally, is deposited because it is less soluble in the alcohol which results from the fermentation process. Argol is deposited as a crystalline crust on the sides of the vat, and when this is recrystallised it is known as tartar; from this, by further purification, cream of tartar is obtained.

Argol occurs in commerce as red argol and white argol, according as it is deposited from red or white grapes. From argol tartaric acid ($\text{H}_2\text{C}_4\text{H}_4\text{O}_6$) is made by neutralising it with whiting and afterwards boiling with calcium sulphate. This forms calcium tartrate and potassium sulphate. The latter is separated out by crystallisation and the calcium tartrate treated with sulphuric acid.

Argolis. A district of ancient Greece. Occupying the N.E. part of Peloponnesus, bordering the Gulf of Aegina or the Saronic Gulf, and the Argolicus Sinus or Gulf of Nauplia, it was the territory surrounding Argos. It became part of the Roman prov. of Achaea in 146 B.C. It has many legendary associations, including that of the Lernean Marsh, where Hercules slew the Hydra. Argolis with Corinthia now forms a nome or department of modern Greece. Its capital is Nauplia. Pop. 190,184.

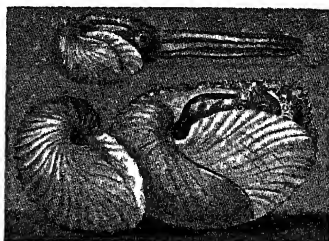
Argon (Gr. *argos*, inert). One of the gases which go to make up the atmosphere. It exists in the proportion of nearly 1 p.c. of air.

At the meeting of the British Association in 1882 Lord Rayleigh mentioned that he had begun a research on the densities of hydrogen and oxygen, and in the experiments he found that the density of nitrogen varies according as it is prepared from the atmosphere or from ammonia. In 1893 chemists were asked to make suggestions to account for this difference. Sir William Ramsay took up the work and adopted the method, devised by Cavendish nearly a century before, of removing the oxygen from air by means of an electric discharge. He also called attention to a remark by Cavendish that there ap-

peared to be a small amount of nitrogen differing from the rest in that it could not be reduced to nitrous acid. He devised a method of removing the nitrogen from air by employing magnesium metal and an electric current and in this way collected a fairly large amount of the residue. Tested by the spectrum method of analysis, the residue gave a different spectrum from that of nitrogen. This proved that a new gas had been discovered, and it was named argon, and the fact published at the meeting of the British Association in 1894.

Argon is an inert gas, and attempts to make it combine with other elements have failed. Sir James Dewar has liquefied and solidified it. Argon is now prepared with comparative ease from the air, provided it is not required in a state of absolute purity. It is of commercial use in filling the bulbs of the tungsten electric lamps, for which purpose it is better than nitrogen. When argon is used lamps can be run at a higher temperature, greater efficiency, and less waste.

Argonaut. Cuttle fish of the genus *Argonauta*. The beautifully ribbed, translucent shell is secreted



Argonaut, or paper nautilus. The upper figure shows the animal swimming

by the flat expansions of two of the arms, or tentacles, of the animal, and it is not attached in any way to the body. Its object is to serve as a receptacle for the eggs. The argonaut is common in the tropic seas: one species, the paper nautilus, inhabits the Mediterranean.

Argonauts (Gr., sailors of the Argos). In Greek mythology, the heroes who, under the leadership of Jason, sailed to Aea or Colchis, on the Black Sea, in search of the Golden Fleece. They were so called from the name of the 50-oared ship Argos which was built by Argos,

Jason was the son of Aeson, who had been deprived of the kingship of Iolous in Thessaly by his half-brother Pelias. To get rid of Jason, Pelias suggested to him that he should fetch the Golden Fleece, which hung in the sacred grove of Mars at Colchis.

Aeetes, king of Colchis, agreed to surrender the Fleece to Jason provided he tamed two fire-breathing oxen with feet of brass, and with them ploughed a two-acre field. He was then to sow the teeth of a dragon, which would produce a crop of armed men, who had all to be destroyed. Finally, he had to kill the dragon guarding the Fleece.

By the help of the magic powers of Medea, the king's daughter, who fell in love with him, Jason succeeded in fulfilling all the conditions, obtained the prize, and started home, taking with him Medea and her young brother Absyrus. They were pursued by Aeetes, but Medea delayed the pursuit by murdering her brother and scattering his limbs in the sea, so that the father would have to pick them up for burial. Zeus in rage sent a storm: the ship declared that the expedition must visit Circe in Ausonia before it could be purified. After evading the fatal allurements of the Sirens, and escaping the perils of Scylla and Charybdis, the voyagers eventually returned to Iolous.

The voyage of the Argonauts is the subject of a Greek poem by Apollonius of Rhodes and of a Latin adaptation by Valerius Flaccus, and is described in Kingsley's *The Heroes*. See Jason; Medea.

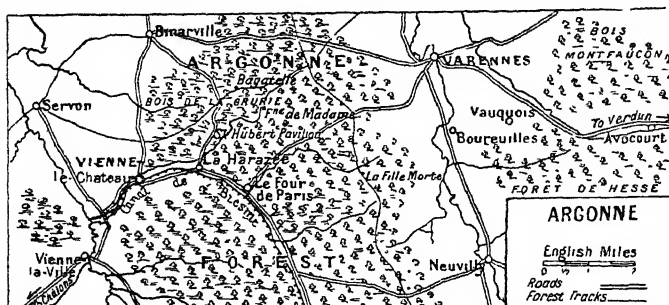
Argo Navis or **THE SHIP ARGO**.

One of the southern constellations, most of which lies below the English horizon. It is so vast that, for convenience of reference, it has been subdivided into four minor groups: Pyxis, the compass; Vela, the sails; Puppis, the stern; and Carina, the keel. It contains 15 stars brighter than the third magnitude, among them Canopus, which is next in brightness to Sirius. See Constellations.

Argonne. District in E. France, known from its wooded character as the forest of Argonne. It covers part of the departments of Ardennes and Meuse, and lies between Toul and Mézières, being a stretch of high ground between the basins of the Meuse and the Aisne. About 10 m. wide from east to west and 40 m. long from north to south, it is densely covered with undergrowth and intersected with ravines.

Argonne, CAMPAIGNS IN THE. Series of operations in the First Great War. The Argonne owed its strategic importance to the fact that a successful advance through it by the Germans would have turned Châlons and Verdun and rendered the French front on the Meuse untenable.

The German Crown Prince with the 5th German army passed



Argonne. Map of the forested area through which the Germans menaced Verdun in 1914 and 1915, and through which the French and Americans drove back the invaders in the closing stages of the First Great War

through the Argonne in the first advance of Aug.-Sept., 1914, and by him Varennes was many times taken and relinquished. During the winter the two entrenched forces were in close contact parted by only a few yards of almost impenetrable bush, barbed wire, and concealed machine-gun posts. In Jan., 1915, the French failed in an effort to storm Bourguilles. In Feb. a fierce struggle opened for the strongly fortified village of Vauquois half of which was captured by the French.

In June, 1915, the German staff determined to make a thrust through the Argonne with about 80,000 men. French positions were heavily bombarded with gas-shells, and between June 20 and July 2 a series of assaults was delivered. About mid-July the battles ended in a virtual stalemate, the French holding all the vital positions.

In the autumn of 1918 Foch, as supreme Allied commander, resolved to clear the Argonne. His force included 22 U.S. divisions with a total strength of 631,000 men (though only 3 divisions had taken part in previous operations): together with 4 French divisions comprising 138,000 troops, including artillery. On the German side 46 divisions were employed.

The U.S. attack opened on Sept. 26 on a front of 18 m. Close cooperation of artillery could not be given, the U.S. staff having put its main trust in telephones and the lines being cut by German artillery fire. Other difficulties hampering the Americans were the lack of roads and light railways: and, as always, the mud. By Oct. 4 the advance totalled only 7 m. But the Germans were at no time strong enough to counter-attack, and on Oct. 29 Marwitz, the German commander, fell back on the W. bank of the Meuse and blew up his ammunition dumps. By Nov. 2 the whole Argonne

region was cleared and an advance of 16 m. accomplished. American casualties in the battle numbered 115,529, including 15,599 killed. French casualties were 7,000.

Argos. City of ancient Greece. In Argolis, 3 m. inland from the head of the Gulf of Nauplia, and said to be the oldest city of Greece, it became the nucleus of a kingdom, with Mycenae as its capital. From being the predominant state, it fell in the 7th century B.C. under the influence of Sparta, but remained independent until conquered by the Romans in 146 B.C. Many remains have been excavated, including those of the Heraeum or temple of Hera, which contained a gold and ivory statue of the goddess. The modern Argos a flourishing town and a junction on the rly. from Corinth to Tripolis, has remains of its cyclopean walls and rock-hewn amphitheatre. Pop. 10,000.

Argostoli. City and seaport of the Ionian Islands, Greece. The ancient Kephallenia and the capital of Kephallonia Island, it stands on the E. shore of the Gulf of Argostoli, and has a good harbour and a naval school. It has a shipbuilding industry, exports currants, wine, and oil. Its mills are driven by sea-water flowing through an artificial cut. Pop. 8,293.

Argosy. Term used, generally figuratively, in the sense of a richly laden ship. Though popularly connected with the vessel Argo in which Jason bore off the Golden Fleece (see Argonauts), the word was said in the 17th century to be derived from Aragouse, a corruption of Ragozie, i.e., a ship from the wealthy port, Ragusa.

Argot. French term for slang. It is applied to the colloquial language of general society; the special vocabulary of a class community, profession, or calling. and—the earliest meaning—the jargon of thieves, rogues, and vagabonds. French slang dates

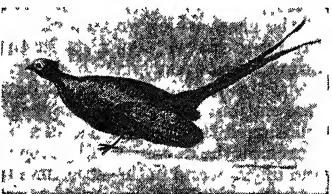
back to the 14th or 15th century, and may have originated among thieves, among the gipsies just appearing, among students, or in the motley gatherings at the great medieval French fairs. The 15th century vagabond-poet François Villon, was the first to use slang in literature, and some of his poems are written entirely in argot.

Argument (Latin *arguere*, to prove). That part of a proof on which rests its validity or power of convincing. The term is often used in the sense of argumentation (demonstration of the proof of something). Arguments may be demonstrative, based upon absolute, necessary truths; or dialectic, based upon relative, contingent propositions, which cannot produce conviction. The *argumentum ad hominem* (to the man) is an argument addressed directly to an opponent, based on his own previous actions or admissions. *A priori* arguments have their origin in reason, a *posteriori* are deduced from experience.

Argun. River of Asia. It rises in the W. of Manchuria and flows mainly N. between that country and Siberia, and unites with the Shilka at Ust-Stryelka to form the Amur. Its length is about 500 m.

Argus. In Greek mythology a being with 100 eyes, of which only two slept at a time. Hera appointed him guardian of Io, whom Zeus had changed into a heifer, but all his eyes were lulled to sleep by the lyre of Hermes. Hera thereupon put his eyes on the tail of a peacock, the bird sacred to her. Argus was also the name of the dog of Ulysses, who died from joy when his master returned after an absence of 20 years.

Argus Pheasant. Species of pheasant found in Malaya and Sumatra. It is notable for the extra-



Argus Pheasant, bird of beautiful plumage. It is a native of Malaysia

ordinary length of the tail feathers and for the beautiful, eye-like spots on its plumage.

Argyle, PEARL (1910-47). British dancer. Born at Johannesburg, Nov. 7, 1910, she studied dancing under Marie Rambert in London. From 1930 to 1931 she danced in three seasons of ballet with Karavina at the Lyric Theatre, Ham-



Pearl Argyle. British dancer, member of several famous ballet companies

mersmith, and appeared in C. B. Cochran's *Helen* at the Adelphi Theatre, 1932. Her performances in *Carnaval*, *Aurora's Wedding*, and *L'Après-midi d'un Faune* reached a brilliant level at the Mercury Theatre in 1934. In 1935 she joined the Sadler's Wells company. She died Jan. 28, 1947.

Argyll, EARL AND DUKE OF. Scottish titles borne since 1457 and 1701 respectively by the family of Campbell. Duncan Campbell of Loch Awe was a lord of Scotland about 1400; his grandson Colin was 1st earl. Archibald, 2nd earl, was killed at Flodden. Archibald, son of the 9th earl, recovered the titles and estates after the Revolution of 1688, and for helping William III was rewarded in 1701 with a dukedom. John, the 2nd duke, served at Malplaquet. John the 5th duke, the second husband of Elizabeth Gunning (*q.v.*), was made a baron of Great Britain in 1766. The 8th and 9th dukes are noticed separately below. In 1949 the titles and estates passed to the 11th duke, Ian (b. 1903), who succeeded a cousin.

The duke is hereditary master of the royal household in Scotland, keeper of the great seal of Scotland, admiral of the western isles, and keeper of the castles of Carrick, Dunoon, and Dunstaffnage. His chief seat is Inveraray Castle. The eldest son is usually known as the marquess of Lorne, and the dukedom has been since 1892 a peerage of the United Kingdom. Readers of Macaulay's *History*, Scott's *Legend of Montrose*, and Stevenson's *Catriona* will know of the power once wielded by the dukes in the W. Highlands.

Argyll, ARCHIBALD CAMPBELL, MARQUESS OF (c. 1604-61). Scottish statesman. Known as Lord Lorne, he began as a young man to administer the estates of his Roman Catholic father. In 1638 he became the 8th earl: and with the quarrel between Charles I and the Covenanters coming to a head, both sides were anxious to secure his aid. A dour Presbyterian, Argyll acted as a military leader of the Covenanters in 1639. Though made a marquess by the king, in the Civil War he took up arms against Montrose and the Royalists, who defeated him at Inverlochy, Feb. 2, 1645. He fled to England, but returned to power and associated himself with Cromwell. After the execution of the king, he changed sides again, and crowned Charles II at Scone in 1651. Commonwealth soldiers marched on Inveraray and after a siege the marquess submitted. Found guilty of treason by the Restoration parliament, he was beheaded in Edinburgh, May 27, 1661.

Argyll, ARCHIBALD CAMPBELL, 9TH EARL OF (d. 1685). Scottish soldier. Eldest son of the above marquess, he fought at Dunbar for Charles II, but submitted to Cromwell in 1655. On refusing to renounce allegiance to the Stuarts he was imprisoned. Released at the Restoration, he was warmly received by Charles, and in 1663 the title of earl and the estates of his father were given back. Through protesting at the harshness employed against the Covenanters, 1671, he fell into disfavour, and in 1681 was tried for treason. After a travesty of justice Argyll was condemned, but escaped from prison to Holland. There he met Monmouth and agreed on the proposed invasion of Britain. He landed in Scotland, but the cause failed. Taken prisoner, he was beheaded in Edinburgh, June 30, 1685, under the sentence of 1681.

Argyll, GEORGE DOUGLAS CAMPBELL, 8TH DUKE OF (1823-1900). British statesman and writer. Born April 30, 1823, he succeeded to the title in 1847 and came quickly into prominence in



George Douglas Campbell, 8th Duke of Argyll

the House of Lords. In 1853 he was made lord privy seal under Aberdeen, and from 1855-58 was postmaster-general. In the Whig ministry of 1859-66 he was again lord

privy seal, and was secretary for India, 1868-74. In 1880 Gladstone made him lord privy seal, but he resigned next year, disapproving of the Irish land bill. Later he bitterly opposed Gladstone's Home Rule measure, but the estrangement was healed when both appeared in public on behalf of the Armenians. The duke died April 24, 1900. He wrote *The Reign of Law*, 1867; *The Eastern Question*, 1879; *Our Responsibilities for Turkey*, 1896. *Concull* Autobiography and Memoirs, 1906.

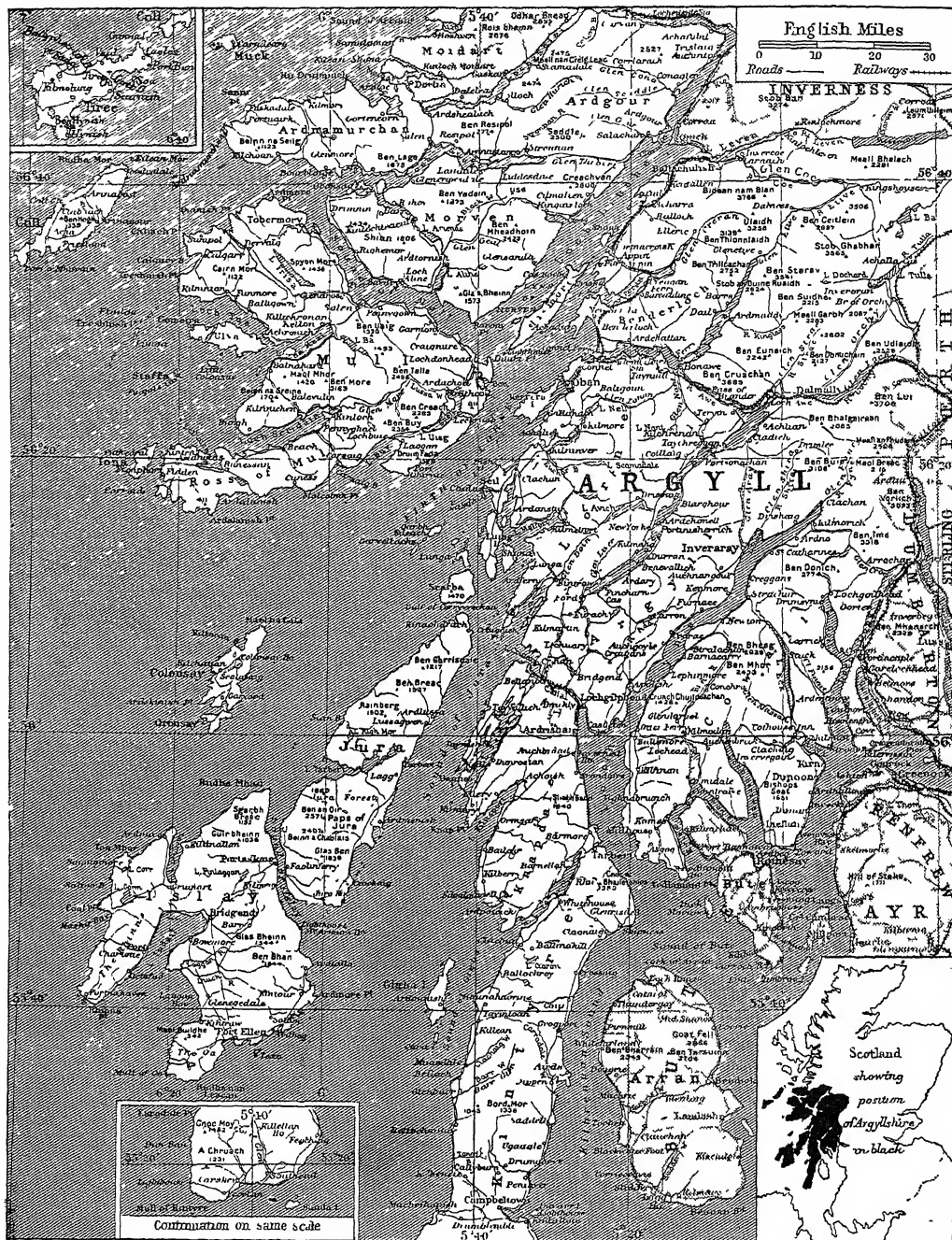
Argyll, JOHN DOUGLAS SUTHERLAND CAMPBELL, 9TH DUKE OF (1845-1914). British politician. He was educated at Eton, St. Andrews, and Trinity College, Cambridge, and was long known as the marquess of Lorne. In 1871 he married the Princess Louise, fourth daughter of Queen Victoria, and from 1878 to 1883 was governor-general of Canada. In 1868-78 he was Liberal M.P. for Argyllshire and in 1885-1900 Liberal Unionist M.P. for S. Manchester. He succeeded to the title and estates in 1900, and died May 2, 1914.

Argyll and Sutherland Highlanders. Kilted regiment, a union of the old 91st (Argyllshire Highlanders) and the 93rd (Sutherland Highlanders). The former was raised in 1794 by the duke of Argyll, and the latter by the earl of Sutherland in 1800. The old 91st specially distinguished itself in the Peninsular War, and formed part of the rearguard at Corunna. The 93rd won renown at the Alma and Balaklava. A detachment of the 91st was on board the *Birkenhead* when she was wrecked in 1852. The regiment bore an honourable part in quelling the Indian Mutiny, and in the S. African and the two Great Wars. A battalion formed the rearguard for the withdrawal to Singapore from Malaya, 1942. Other battalions served in Tunisia, notably at Longstop Ridge, April, 1943, and with the B.L.A., crossing the Rhine with the Highland division (*q.v.*).

Argyll Rooms. Fashionable London pleasure resort in the early part of the 19th century. Originally a large house in Little Argyll Street, London, W., it was bought by a Colonel Greville and converted into a place of public entertainment, where masquerades, balls



A. and S. Highlanders' badge



Argyllshire. Map of the westernmost county of Scotland. Ardnamurchan Point in this county is the most westerly portion of the mainland of Britain. The county is cut up by many lochs and bays into peninsulas and islands

and concerts took place. Rebuilt by John Nash, the premises were burnt down while in the occupation of M. Chabert, known as "the fire king," Feb. 5-6, 1830.

Argyllshire. Western maritime and second largest co. of Scotland.

It includes most islands of the Inner Hebrides, the principal being Mull, Islay, Jura, Tiree, Coll, Lismore, Colonsay, and the small and picturesque islands of Iona and Staffa. Its greatest length is 114 m., extreme breadth 55 m., and

area 3,110 sq. m. The co. is served by the Scottish Region of British Railways, and by the Crinan Canal, which connects Loch Fyne with the Sound of Jura. The coast measures more than 2,000 m. and is broken by

many sea-lochs (Linnhe, Fyne, Moidart, Sunart, Long) and land projections (Ardnamurchan, Morven, Kintyre).

The surface is generally rugged and mountainous (Bidean nam Bian 3,766 ft., Ben Cruachan 3,689 ft., Stob Ghabhar 3,565 ft., Ben Ime 3,318 ft., Ben More 3,169 ft.), with low-lying coast districts. Loch Awe is the largest lake, and the chief streams, short, rapid, and unnavigable, are the Orchy and Awe. Sheep and cattle rearing and herring and salmon fishing mainly engage industrial attention less than 10 p.c. of the land being under cultivation. Slate is quarried at Easdale and Ballachulish, coal is worked near Campbeltown, and granite and limestone are also found. Strontian was formerly noted for its lead mines. In Islay and at Campbeltown there are whisky distilleries, and Kinlochleven has a large aluminium works. Inveraray is the county town, and Campbeltown, Dunoon, Oban, Lochgilphead, and Tobermory are next in importance. There is one member of Parliament. Pop. 63,014.

Argyrokastro (Albanian, GJINOKASTER). Town of Albania. Called Ergeri or Ergi by the Turks when it formed part of the vilayet of Janina, it is an important centre of N. Epirus. It lies about 50 m. N.W. of Janina, on the E. declivity of the Acroceraunian Mts. on a tributary of the Vijose. It is noted for its snuff. It was occupied by the Greeks in 1916, and later by the Italians. During the Italo-Greek war (1940-41) the town became the main Italian forward base in South Albania, but was captured by the Greeks on Dec. 8, 1940. But they withdrew when Greece was invaded by the Germans in April, 1941; and only in Dec., 1944, when the Germans abandoned their hold upon Albania, was Argyrokastro freed. Pop. 10,836, mostly Greeks.

Ariadne. In Greek mythology, the daughter of Minos, king of Crete. Theseus, on his arrival in Crete with the tribute of young men and maidens to be devoured by the Minotaur, was shown by Ariadne how to find his way out of the labyrinth, the monster's dwelling-place, by means of a ball of thread. He took Ariadne away with him, but deserted her on the island of Naxos while she slept. Here the god Dionysus (Bacchus) took her to wife, and set her crown among the stars; or took her away by force from Theseus when they landed. In Homer, Ariadne was killed by Artemis on her arrival at

Naxos; in another account, she slew herself when abandoned by Theseus. Ariadne was a nature goddess, whose desertion by Theseus and marriage to Dionysus may symbolise the death and revival of vegetation in winter and spring respectively.

Aria Form. Term applied to music constructed after the formula A-B-A. A represents one section more or less complete in itself, sometimes repeated; B is a new section, for contrast; and a recapitulation of A, entire or modified, completes the aria. This form, in embryo, is found in popular airs such as "Charlie is my darling."

Ariana or **ARYANA**. Ancient division of Asia. In the widest sense it comprised the territory peopled by Aryans lying between the Tigris on the W. and the Indus on the E.

Arianism. Name given to the doctrine, maintained by Arius in the 4th century, denying that Christ was equal to or was of the same substance with God the Father. The doctrine may be traced to the teaching of Paul of Samosata, but was first systematised by Arius, a priest of Alexandria, and Athanasius was its great opponent.

The controversy had become acute by 323, and in 325 the Council of Nicaea condemned Arius and formulated the earliest published declaration of the Catholic Faith—the Nicene Creed, in which the decision of the Council is to be found, with a few verbal differences, down to the words "in the Holy Ghost." All the bishops but two subscribed to the decision. Eusebius of Nicomedia subscribed, but altered the (Greek) word *homo-ousion* = of one substance with, into *homo-i-ousion* = of a similar substance. Words of anathema were added to the declaration.

But Arianism was not extinguished. It was in the ascendant even under Constantius, the son of Constantine and Valens (353-378), but, Theodosius I declaring for Athanasianism, the second great council of the Church, held at Constantinople, 381, restored the authority of its predecessor of 325. Divided among themselves, the Arians declined in numbers and influence within the Roman empire. Meanwhile, however, the heresy spread among the West Goths, whose adoption of Arianism was one of the conditions of their settlement in Thrace; the East Goths in Italy, the Vandals in Africa, the Suevi in Spain, the Burgundians in Gaul,

and the Lombards in Upper Italy, until its fate was sealed by the triumph of the Franks under Clovis, who was baptized at Reims in 496. It reappeared in Europe in the 16th century in Poland, and in England from Henry VIII to James I there were executions for Arianism. Today it may be traced in the forms of Unitarianism, Socinianism, and Deism. Arianism was not compatible with the doctrines of the Trinity and the divinity of Christ. See Arius; Athanasius.

Ariano di Puglia. Town and episcopal see of Italy, in Avellino province. It stands among the Apennines, 24 m. by rly. E. of Benevento, and has sulphur mines, marble quarries, and earthenware manufactures. Many of the people live in rock caves. Pop. 8,500.

Arica. Northernmost seaport of Chile. In Tarapaca prov., 39 m. by rly. S. of Tacna in Peru, it is the terminus of the rly. across the Andes to La Paz, of which it is chief port of entry. Taken by Chile from Peru in 1880, it was long the subject of dispute, but Chilean possession was amicably confirmed, on the arbitration of the U.S., by an agreement at Lima, 1929. Exports include copper, silver, gold, iron, salt, sulphur, guano, borax. Pop. 13,140.

Arichat. Seaport of Nova Scotia, Canada. The capital of Richmond county, and the seat of a Roman Catholic bishop, it stands on the S. side of Madame Island, and is served by the Cape Breton Rly. It has a deep harbour, fisheries, and a canning industry.

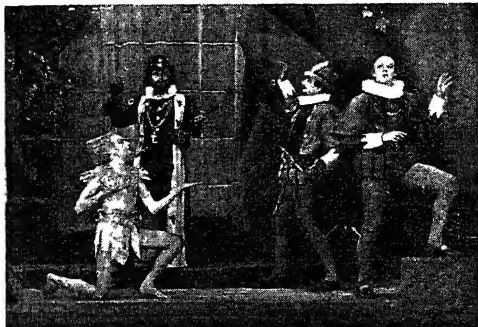
Aricia. One of the oldest cities of Latium, standing on the Appian Way, 16 m. S.E. of Rome. Opposing Rome, it was conquered by C. Maenius in 338 B.C., being subsequently granted full rights of citizenship. The modern town of Ariccia lies to the N.

Ariège. A department of S. France. It is bordered on the S. by the Pyrenees, of which it includes some of the highest peaks, and is watered by the Ariège and the Salat. Agriculture, the cultivation of the vine, and the mining of iron and other minerals are the chief industries. Foix is the capital. The area is 1,392 sq. m. Pop. 155,134.

Ariel. Dainty sprite who waits on Prospero's commands in Shakespeare's comedy *The Tempest*. Although the name is of Hebrew origin, Ariel is the delicate, gossamer-winged fairy of English folk tales. Throughout the play Ariel voices a longing for freedom and at last is restored to

the liberty of the unchartered elements. Shakespeare gives Ariel three exquisite fairy songs: Come unto these yellow sands, Full fathom five thy father lies, and Where the bee sucks, there suck I. In Milton's *Paradise Lost* (vi, 371) Ariel is one of the fallen angels, and in Pope's *Rape of the Lock* a sort of fairy lady's-maid to Belinda. See *Tempest*, The.

Ariel. Man of Moab whose two sons were slain by Benaiah, son of Jehoiada (2 Sam. 23: 1 Chron. 11.



Ariel casts a spell at the bidding of Prospero. Dennis Hutchinson as Shakespeare's dainty sprite in a Stratford-on-Avon production of *The Tempest*, 1938

R.V.). The name occurs on the Moabite stone in allusion to an altar, is used as the name of a man in Ezra 8, and applied symbolically to Jerusalem in Isaiah 29, and in the Hebrew of Ezek. 43 to the altar of burnt offerings. The word means lion, or altar, of God.

Aries (Lat., ram). One of the twelve signs of the Zodiac. Through it the sun passes on its annual round, and it was associated in Greek mythology with the voyage of the Argonauts in search of the Golden Fleece. Aries is an important but small constellation close below the greater W that lies beneath the smaller W of Cassiopeia's Chair. It can also be found by following the stars which mark the belt of Andromeda. The only stars in the constellation—which are usually known by their Arabic names—are the three on the Ram's head. Alpha is known as Hamal, which is Arabic for Ram, and Beta and Gamma bear the names Sheratin, the two signs, and Mesartin, the two attendants. The "first point of Aries" is the point of the heavens at which the sun annually crosses the Equator at the vernal equinox. Owing to the precession of the equinoxes, this point is now actually in the constellation Pisces, but is still conventionally called the first point of Aries. See *Zodiac*; *Precession*.

Arietta (Ital., little aria). In music, a short and less important

aria, frequently without definite second and third sections. See *Aria*.

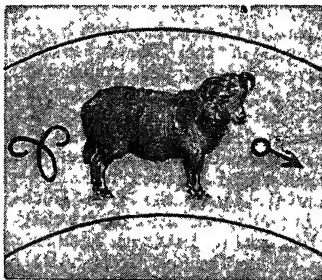
Aril (late Latin *arillus*, dried grape). Fleshy coating to certain seeds, arising from the placenta. The best examples are found in the "mace" that encompasses the nutmeg, and the orange-coloured wrapping of the seed that helps to make opened seed-vessels of the spindle-tree so conspicuous.

Arimaspi. Mythical people of Scythia. They are referred to by Herodotus (iv, 13, 27) as dwelling to the E. of the Caspian Sea. Pausanias describes them as all one-eyed men from birth, constantly at war with the griffins guarding the gold of the river Arimaspius, probably in the Altai district of Russia. Aeschylus makes them inhabitants of Africa. Cf. Milton, *Paradise Lost*, ii, 943: The Arimaspi, who by stealth Had from his [the griffin's] waketul custody purloined The guarded gold

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Aries, or the Ram, one of the twelve signs of the Zodiac

edition (Ferrara, 1532) the poem appeared in an enlarged form and assumed its final proportions. His other writings include five comedies and some graceful sonnets.

After serving the cardinal faithfully for 14 years Ariosto was dismissed without further reward, but soon after joined the household of the cardinal's brother Alfonso, duke of Este. In 1522 the poet undertook, with success, to quell a rebellion in the Garfagnana province, of which he later became governor, but after three years returned to Ferrara. He died June 6, 1533, and was buried in the Church of San Benedetto, Ferrara, where a handsome monument was erected to his memory. Eng. translations of the *Orlando*: Sir J. Harington, 1591; T. H. Croker, 1755; W. Huggins, 1757; J. Hoole, 1773-83; W. S. Rose, 1823-31. See *The King of Court Poets*, E. G. Gardner, 1906; *Life and Genius of Ariosto*, J. S. Nicholson, 1914.



Ludovico Ariosto
Portrait by Tizian

Ariovistus. A German chief, mentioned in Caesar's Gallic War. In 60 B.C. he crossed the Rhine with his followers to help the Sequani against the Aedui, whom he defeated. He then invaded Gaul and took some territory from the Sequani. After refusing a conference with Caesar, whose assistance was invoked by the Aedui, Ariovistus was driven back across the Rhine by the Romans in 58 B.C.

Arisaig. District of Inverness-shire, Scotland. It lies between Lochs Ailort and Morar, and is partly covered by a deer forest. The village of Arisaig is 34 m. N.W. of Fort William, on a branch of the L.N.E.R.

Arish, EL. Harbour of Egypt. It stands on the Mediterranean, near the boundary between the Sinai Peninsula and Palestine, and is on the caravan route from



Arish. View of the Egyptian town as seen from the S.E. From here in the First Great War the British constructed a railway into Palestine

Beersheba to Egypt. It was taken by Napoleon in 1799 and during the First Great War was occupied by the Turks, from whom it was captured by the British on Dec. 21, 1916. The advance of the British troops was facilitated by the construction of a rly. to this point, since extended over the Palestine border and as far as Haifa.

Arista, MARIANO (1802-1855). Mexican general. Born at San Luis Potosí, July 26, 1802, in 1846 he took command of the Mexican army of the north in the war with the U.S.A., but, being defeated at Palo Alto (May 8) and Resaca de la Palma (May 9), he was recalled. War minister in 1848, he was president of Mexico in 1851-53, and resigning, was banished to Europe. He died at sea, Aug. 7, 1855.

Aristaeus. In Greek mythology, son of Apollo and the nymph Cyrene. He was the protector of flocks and herds, of shepherds, and of vine and olive plantations. In Virgil's *Georgics* (iv) he is connected with the story of Orpheus and Eurydice (*q.v.*).

Aristagoras (d. 497 B.C.). Tyrant of Miletus in Caria. He persuaded Darius, king of Persia, to aid him in an attack on Naxos, but the expedition miscarried. Fearing the wrath of Darius, who hoped to obtain possession of the island, Aristagoras stirred up the Greek cities of Asia Minor to revolt against Persia. Having obtained aid from the Athenians, the combined forces marched on Sardes, which was captured and burnt. Unable to hold the city, the Greeks, deserted by the Athenians, were forced to retreat to the coast, and their cities passed again under Persian rule. Aristagoras fled to Thrace, where he was killed shortly afterwards while fighting against the wild tribes of the country.

Aristarchus of Samothrace (c. 220-145 B.C.). An Alexandrian grammarian and critic. He was a pupil of the grammarian Aristo-

phanes of Byzantium at Alexandria, where he founded a critical and grammatical school and superintended the education of the children of Ptolemy VI Philometor. When his pupil, Ptolemy Physcon, who had usurped the throne, began to persecute men of learning, Aristarchus fled to Cyprus, where he is said to have starved himself to death.

He devoted his labours to the explanation and restoration of the text of the most important Greek poets. His great work was his recension of the *Iliad* and *Odyssey*, which is the basis of all subsequent texts. In this he made use of critical marks to indicate spurious or interpolated passages.

Aristarchus of Samos. Greek astronomer, who lived in the third century B.C. He is said to have been the first to state that the earth moved round the sun.

Aristeas (c. 550 B.C.). Greek poet. A native of the island of Proconnesus. His poem, *Arimaspeia*, contained an account of his travels on the north coast of the Black Sea and of the *Arimaspi* (*q.v.*) and other similarly fabulous peoples.

Aristeides OR **ARISTIDES** (c. 550-467 B.C.). An Athenian general and statesman, surnamed the Just. After the first Persian War, in which he fought with distinction at Marathon, he opposed the policy of Themistocles, who regarded the creation of a fleet as the best bulwark against Persian aggression. The differences between them became so acute that in 483 ostracism (*q.v.*) was resorted to, as a result of which Aristeides had to go into exile. He did good service, however, in the second Persian War, with a force raised by himself privately, and in 479 commanded the Athenians at the battle of Plataea. When, owing to the arrogance of Pausanias, the states of Greece, which had formerly

looked to Sparta as their leader, transferred their allegiance to Athens, and the Delian league was formed, Aristeides was chosen to organize the league, and to determine the contribution of each state. In domestic politics though an aristocrat by birth, Aristeides, recognizing that the spirit of the times demanded it, was responsible for the further democratisation of the Athenian state. He improved the political status of the Thetes, the fourth and lowest class of citizens, and was in favour of admitting all classes to the archonship. In 467 he died in such poverty that there was not enough money to pay for his funeral.

Aristeides OR **ARISTIDES** (fl. 360-330 B.C.). Greek painter. A native of Thebes, he excelled in the rendering of expression and emotion, though his colouring is said to have been rather harsh. His most famous picture represented a mother suckling her child though mortally wounded, her face depicting her anguish lest the infant should draw blood instead of milk. Attalus, king of Pergamus, paid 100 talents (£20,000) for one of his pictures.

Aristeides OR **ARISTIDES** (1st century B.C.). Greek writer. He was the author of *Milesiaca*, scenes of Milesian life, which, translated into Latin, was very popular among the Romans.

Aristeides OR **ARISTIDES**, **PUBLIUS AELIUS** (c. A.D. 129-189). A Greek rhetorician, born in Mysia. Trained by the most famous rhetoricians and literary men, he travelled much, lecturing from place to place. The citizens of Smyrna owed to him the rebuilding of their city after its devastation by an earthquake, the result of an appeal to his friend, the emperor Marcus Aurelius. Aristeides' extant works consist of two treatises on rhetoric and a number of speeches.

Aristippus (c. 430-360 B.C.). Greek philosopher. A native of Cyrene, he was the founder of a school of philosophy, hence called Cyrenaic. He taught that happiness was to be found in the enjoyment of the present, to the neglect of all considerations of the past or the future, but that for the truest enjoyment of what lay to hand the cultivation of wisdom was essential. The doctrines of Epicurus were a development of this teaching. Aristippus was one of the pupils of Socrates and was the first to seek payment for his teaching. See Cyrenaics.

Aristochin. Tasteless form of quinine. Chemically carbonylquinine, it is made by acting on quinine with phosgene gas. See Quinine.

Aristocracy (Greek *aristos*, best; *kratos*, government). Term meaning originally the rule of the best men. To-day, however it is used in a somewhat different sense, meaning not a system of government, but a class of men and women distinguished from their fellows by superior birth or position. By an extension such terms as aristocracy of intellect and aristocracy of wealth are used.

In its older sense the word was used by Aristotle to define one of three forms of good government. He contrasted aristocracy with oligarchy; both mean the rule of the few, but in one case the few are the best men, those who rule solely with regard to the public welfare, and in the other case they are not. Government by an aristocracy has been fairly common in the history of the world, although perhaps it would be more correct to describe most of such governments as oligarchies; they were certainly the rule of the few, but it is questionable whether they were the rule of the best. Some of the city states of ancient Greece, especially Sparta, perhaps enjoyed

the nearest approach to real aristocratic government known, but that of Venice was an oligarchy. An aristocratic government may be also the rule of a single man provided that man is the best man—for instance, the philosopher king of Plato's Republic. To-day the antithesis in the popular mind is between aristocracy and democracy, government by the many against government by the few. See Government; State.

Aristogeiton OR ARISTOGITON Friend of Harmodius. With him he conspired to assassinate the tyrant Hippias and his brother Hipparchus at Athens in 514 B.C. See Harmodius.

Aristolochia (Gr. *aristos*, best; *locheia*, childbirth). Large genus of shrubs and perennial herbs. It includes about 250 species, chiefly natives of tropical regions, especially S. America. Birthwort (*A. clematitis*) is European, and has been long naturalised about ruins in England, owing to its former use in medicine. It has heart-shaped leaves and yellow flowers.

Dutchman's Pipe (*A. siphon*) is a N. American climbing shrub,

with yellow-brown flowers the shape of which has suggested the popular name Snake-root (*A. serpentaria*) has a reputation as a cure for snake-bites in America, and other species of these plants have similar virtues.

Aristolochiaceae. Natural order of shrubs and herbs. They have irregular flowers consisting of a dull-coloured calyx with six stamens and a solitary pistil. The

lower part of the flower is inflated, and this portion in some species acts as a trap for flies, which are made use of as agents in cross-fertilisation. The two principal genera are *Aristolochia* (Birthwort) and *Asarum* (Asarabacca).

Aristophanes (c. 445–385 B.C.). Athenian comic dramatist. It is doubtful whether he was an Athenian citizen, and little is known of his private life. Fifty-four comedies in all were attributed to him, 11 of which survive. His first comedy, *The Banqueters*, was produced in 427 B.C., and the second edition of the *Plutus* in 388. He was conservative in his ideas, the Athens of the Persian Wars being his golden age. The newer Athens was distasteful to him; he disliked the growth of democracy and the rationalistic attitude towards religion and morals associated with the Sophists.

His earlier comedies, such as *The Knights*, *The Clouds*, and *The Wasps*, contain most violent personal attacks upon those who in his eyes stood for the tendencies he deplored. The demagogue Cleon and the philosopher Socrates, whom he unjustly identified with the Sophists, were particularly obnoxious to him. His attacks upon Cleon brought upon him the enmity of the latter, who made an unsuccessful attempt in the law courts to call in question the citizenship of Aristophanes. However, he appears to have learned caution, for his plays during the next period of his dramatic career, such as *The Birds* and *The Frogs*,



Aristolochia. A. siphon. or Dutchman's pipe are credited with similar virtues.



Aristolochiaceae, Asarum Europaeum



Aristides accosted by a peasant who, not knowing him, wished him to write the name of Aristides as one to be ostracised—because he was tired of hearing him called *The Just*. See p. 607.

Painting by E. E. Hillemacher, Dijon Museum

in the second of which Euripides is held up to ridicule, were much less outspoken, while in his last personal satire almost disappeared.



Aristophanes,
Greek dramatist
Capitol, Rome

the Old Comedy as contrasted with the Middle and the New.

Many comedies derived their names from the creatures which the chorus were dressed up to represent, e.g. *The Wasps*, *The Birds*, *The Frogs*. Aristophanes is the chief representative of what was known as the Old Comedy as contrasted with the Middle and the New.

In spite of his strong political convictions, Aristophanes lacks any constructive notions of his own. He is primarily a comedian. Though many of his allusions are unintelligible owing to our ignorance of contemporary conditions, his work can be appreciated and enjoyed by the modern reader. His humour is irresistible and his wit unfailingly brilliant. Not only was he a supreme comic genius; for beauty and delicate fancy some of his lyrical passages challenge comparison with those of Shakespeare. There is a spirited English verse translation by B. B. Rogers, Loeb Classical Lib., 1924. See *Greece, Literature, Drama; Comedy*. Consult *Aristophanes, a Study*, Gilbert Murray, 1933.

for his province, and by dint of sheer assimilative capacity, coupled with scientific insight, presents to the world a veritable encyclopedia of science, learning and philosophy.

Most of the works ascribed to Aristotle have perished. Among the lost books are letters, speeches, poems, philosophical dialogues, treatises on national festivals and dramatic contests, and manuals of natural history and rhetoric. It is on these lost works that Aristotle's fame as an accomplished stylist was founded. What has survived are not his highly finished literary efforts, but lectures and treatises of a technical and academic order. Intermediate between the two classes is *The Constitution of Athens*, one of 158 similar surveys published in 1891 from a papyrus found in Egypt. Altogether the extant works, though forming not more than a fifth of the total output, serve to indicate the amazing range of the author, in virtue of which Dante might well salute the Stagirate as the "master of those who know."

The Theory of Teleology

The large portion of the *corpus* occupied by works on natural science and natural history, now covered by the special sciences of astronomy and the like, suffers from the limitations of all early research. Even so the three works, *The History of Animals*, *On the Parts of Animals*, and *On the Generation of Animals*, have elicited from the greatest scientists unstinted praise. Of crucial importance is the theory of teleology, expounded most fully in *De Anima*. There Aristotle asserts that not only human life, but animal and plant life also, are dominated by a soul dwelling in every creature, preserving the material body from decay and determining its growth towards completion. This principle, appearing at its highest in man as mind, is the form, and efficient cause, and end of the physical organism, and by this principle Aristotle was able to explain organic life and growth everywhere as a development from the merely potential to the actual. Such a point of view anticipates modern inquiries into purposive forms of life, and links up with evolutionary ideas in general. Again, as a master of classification and an acute observer, Aristotle reveals prodigious ability in this sphere.

Of the six works collected by a later hand in the *Organon*, the *Prior Analytics* shaped once for all the doctrine of the syllogism, while the *Posterior Analytics* expounded the nature of exact or

ARISTOTLE: THE FATHER OF LEARNING

T. Callander, Former Prof. of Greek, Queen's Univ., Canada

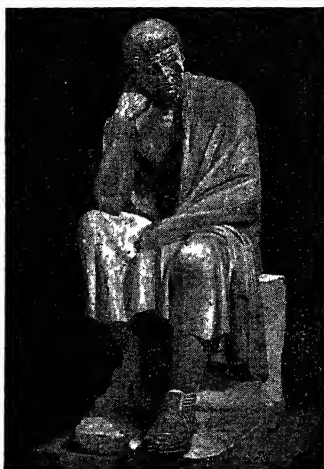
This sketch of the life and work of the great Greek scholar is a necessary preliminary to the study of many of the great branches of learning. See Ethics; Logic; Metaphysics; Philosophy, etc.

Aristotle, the Greek philosopher (384-322 B.C.), was born at Stagira in Macedonia. His father Nicomachus was physician to Amyntas II, grandfather of Alexander the Great. In 367 Aristotle went to Athens and spent 17 years in association with Plato. Several years of adventure in Mysia followed, including a romantic marriage. In 343 he was called to Macedonia by Philip to undertake the education of his son, then a boy of fourteen. A college was built, and for seven years, with interruptions, the profoundest intellect of the age was occupied with the training of the supreme man of action. When Alexander, in 334, passed into Asia "to subdue the world," Aristotle returned to Athens, founded his Peripatetic School at the Lyceum, and there, supported by gifts from his royal friend, lived for the next twelve years absorbed in lecturing and scientific research. In 323 death removed his protector and, mindful of the fate of Socrates, he retired to Euboea to spend the last months of his life in peace, declaring that Athens must not sin a second time against philosophy.

Aristotle and Plato

Platonism forms the background of Aristotle's thought. Like Plato, he views the universe as a system of particular things capable of being grouped according to kinds or species, each endowed with a nature that can be known. This nature is for Aristotle, as for Plato, not particular but universal, but the tendency in the master to affirm the superior reality of

universals or ideas against the multitude of particulars is modified in the pupil by his strong scientific and biological leanings. In Aristotle the conviction that ideas have no existence apart from



Aristotle, Greek philosopher who took all knowledge for his province
Statue in Spada Palace, Rome

things leads him to wage war against the supra-sensual ideas of the Platonists, while it stimulated his passion for exact and comprehensive observation. In every department of scientific inquiry he seeks to determine the facts, to register and classify the results, disposing of them in such a way that they reveal their true character and form the materials out of which higher generalisations may emerge. In such a spirit he takes the whole circle of knowledge

demonstrative science. On these rests the fame of Aristotle as the inventor of formal or, if the importance of the syllogism be accentuated, deductive logic. It was as a rival to the *Organon* that Bacon wrote his *Novum Organum*, thus earning the title of the inventor of inductive logic. Bacon professes to supply a theory or method of scientific discovery, whereas Aristotle, although he explicitly subordinates his theory of the syllogism to the wider problem of the nature of scientific inquiry, lays too much stress relatively on the form in which the results of discovery are set forth.

Aristotle's Poetics and Rhetoric

The *Poetics* not merely contains valuable information about the origin of tragedy, it lays the foundation of modern aesthetic. Unlike Plato, Aristotle makes the imitative character of poetry and art no reproach against their claim to be a valuable function of life, but rests upon that character the special capacity of all the arts to achieve their proper ends. That end is, in each case, the worthy employment of leisure, or true recreation, which is further defined in connexion with tragedy as the purgation of the emotions. By a flash of genius he divines the serious function of high art, and leaves to future criticism the task of developing the fertile suggestion thus thrown off. From the suggestion of idealising imitation the theory of the symbolic in art has evolved. In this difficult region Aristotle again is the starting-point for later investigation.

The same talents, combined with his sure and cultured taste, have made his three books on *Rhetoric* a classic. The main theme is oratory, treated as the art of producing conviction by persuasive speech. There are admirable sections on the emotions and how to control them, and on types of character, besides much refined criticism of diction and figurative speech. The fruits of his omnivorous reading are lavishly used and, if his neglect of lyric poetry throughout argues undue intellectualism in his mental make-up, he leaves a deep impression of broad and quick artistic sympathies.

In the *Ethics* and the *Politics* Aristotle analyses the Hellenic moral and political order, pronouncing it, with reservations, good. The supreme end is happiness, defined as an activity of the soul in accordance with virtue in a sufficiently long life. The external conditions of happiness having been briefly sketched, the *Ethics* pro-

ceeds to elaborate the morality of the Hellenic citizen, concluding with an attempt to bring the inner life so described into relation with the world of affairs. In opposition to the Stoics, Aristotle contended that external goods, environment generally, are not indifferent. Not negation but subordination is his maxim here. At the highest the good life will make every good thing serve its purpose. On the other hand he allows large scope to the capacity of virtue to rise superior even to hostile surroundings. In the *Politics*, while still remote from the Christian view which approves hardship as a condition for the promotion of virtue, he makes the striking concession to the good life that it may make a noble use of poverty and disease itself.

True to his governing principle of the mean, he rejects all extreme social and political programmes. He defends the family, and even justifies slavery in cases where the free citizen is of a superior race; he rejects communism and prefers aristocracy to either extreme of monarchy or democracy. A mixed constitution is best of all, and is most secure against civil strife, the bane of the Hellenic state. His plan of education is conceived in the most liberal spirit, and does full justice to the claims of disinterested culture as well as to the more obvious practical needs.

Among essays in the higher logic the *Metaphysics* is almost without a rival. Its subject is Being, not of a particular kind, but Being as such. How the universe of our experience, composed of a multitude of individuals and species, exposed to constant change, can form the subject of one science is a problem. In face of the difficulty Aristotle is assured that the Being or Essence of which every thing is a manifestation does present a proper object for treatment by a supreme science, which he calls first philosophy. This Being is alleged to be the only thing possessing reality by itself, and to it all other forms of being are referred.

The Immanence of Ideas

Thus, in spite of his emphatic denial of the independent existence of universals, and despite the prior reality which he claims for the individual, he recurs to the theory of Being or Essence as the first cause of every particular existence. In the particular he discerns, on a last analysis, four causes—material, formal, efficient, and final, but these are precisely what in combination constitute the object, converting the potential existence into the actual thing. As the appropriate

object of our highest knowledge this first essence is that which is most real: it is apprehended by mind, and ultimately is identified by Aristotle with God. Thus the gain marked by Anaxagoras when he introduced the conception of mind into cosmological theory, a gain extended by Socrates and Plato, was consolidated by Aristotle's doctrine of the immanence of ideas.

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Arita, HACHIRO (b. 1884). Japanese diplomat. He was ambassador to Belgium, 1934-36, then to China. From March, 1936, to Jan., 1937, he was foreign minister in the Hirota government, returning to the same office in Oct., 1938, in the Konoye government, when he was responsible for the Japanese part in the Anti-Comintern Pact (*q.v.*). He retained his post in the Hiranuma administration of Jan. to Sept., 1939, and returned for a few months in 1940, serving under Yonai, who was superseded by Konoye in July, 1940, when Arita was replaced by Matsuoka (*q.v.*).

Arithmetic (Greek *arithmos*, number). The science of numbers. The primitive operation of arithmetic is counting; the process of addition affords a rapid and convenient method of counting, while the inverse operation, subtraction, may be regarded as a short method of counting backwards. Multiplication is a contracted form of addition, and division a contracted form of subtraction. Addition.

subtraction, multiplication, and division make up the four fundamental rules of arithmetic. The concept of fractions is based on that of division. Complicated arithmetical calculations have been greatly simplified by the invention of logarithms.

Arithmetic, by its simplification of the operation of counting and the derived process of measurement, gives us a firm grip on the real physical world and reduces our vague ideas of number and quantity to precise form. Its cardinal importance in commerce, government, war, and science, and in the business of life generally, needs no emphasising.

The progress of arithmetic was long hampered by the lack of a suitable notation. The number which in the present Arabic system of notation is written 888 was written by letters in the Greek and DCCCLXXXVIII in the Roman system. The inconvenience of the Roman notation for arithmetical work is here obvious at first sight; the advantage of the Arabic system over the Greek lies in the fact that while in the latter one letter stands for eight hundred, another for eighty, and yet another for eight, the symbol 8 can signify eight or eighty or eight hundred according to position. The symbol 0 is of decisive importance in the Arabic system as a means of discriminating between two numbers like 88 and 808. This simple idea of ascribing values to the symbols dependent on their relative positions has produced a system which combines the economy in the number of fundamental symbols of the Roman system with the compactness of the Greek, and adds to these qualities a flexibility all its own. The medieval invention of decimals to represent fractions (e.g. $1\frac{7}{10}$ for $1\frac{7}{10}$) has put the finishing touch to the Arabic system. See Cube Root; Decimals; Indices; Logarithms, etc.

ARIUS or **ARIEUS** (c. 256-336). Originator of Arianism, a disruptive heresy in the Christian Church. Born in Libya, he was educated under Lucian of Antioch, and after being ordained deacon was excommunicated by Peter, bishop of Alexandria, for supporting Meletius, bishop of Lycopolis, who had apostatised during the Diocletian persecution and wished to resume his bishopric. On Peter's death, 311, Achillas, the next bishop of Alexandria, reconciled Arius to the Church and ordained him to the priesthood,

placing him in charge of an important church in Alexandria. Alexander, who succeeded Achillas, regarded Arius favourably, and it was not until about 318 that the Arian controversy seriously disturbed the peace of the Church.

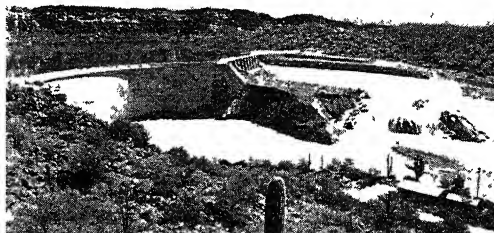
Alexander having declared the doctrines of the Trinity and of the divinity of Christ in the accustomed form of the Catholic Church, Arius detected in this statement an attack on the unity of God, and affirmed that Christ was created by God out of nothing. The obvious conclusion of this doctrine was that Christ, not being co-eternal and consubstantial with God the Father, was ranked as a demigod. A council of bishops excommunicated Arius at Alexandria in 321, and he retired to Palestine, appealing to Eusebius, bishop of Nicomedia. Eusebius took up his cause and collected a number of bishops to annul the excommunication. This was done at Bithynia in 323.

The controversy was now so acute that the emperor Constantine summoned a general council to decide the question. The council, which met at Nicaea, 325, decided against Arius. Excommunicated on refusing to accept the definition of Nicaea, Arius retired to Illyricum. He succeeded later in gaining the sympathy of Constantine and in 328 was allowed to leave Illyricum. Two years later, he satisfied the emperor as to his belief and Athanasius, then bishop of Alexandria, was ordered to receive him into his diocese. Athanasius on refusing was exiled, 335, but the return of Arius to Alexandria was followed by disturbances, and in 336 he departed to Constantinople, where he died suddenly. Constantine had then ordered Alexander, bishop of Constantinople, to admit Arius to communion.

Of the work of Arius in verse and prose known as *Thaleia*, or *The Banquet*, and addressed to Eusebius, only fragments are extant. See *Arianism*.

Arizona. Western state of the U.S.A., bounded N. by Utah, E. by New Mexico, S. by Mexico, W. chiefly by the Colorado river. It is 400 m. long, 335 m. broad, and covers 113,909 sq. miles. The

Colorado traverses a plateau from 6,000 to 8,000 ft. high in the N.W.; towards the centre are the Mogollon mts.; between these regions the San Francisco mts. reach 12,565 ft., while most of the surface is over 5,000 ft. In the S.W. is much desert, but deep valleys separate the short mountain ranges, and good crops are raised by irrigation in the Gila, Salt, Casa Grande, and Yuma valleys.



Arizona. Stewart Mountain Dam, one of a series built to serve the Salt River federal reclamation scheme

There are many cañons, the Grand Cañon of the Colorado being a wonder of the world, 217 m. long, up to 18 m. across, and over a mile deep. Petrified forests and the Painted Desert of the Navajo Indians are great scenic marvels. Boulder Dam and six other huge hydraulic works are in the state. Mining is the chief industry; Arizona is the leading state for copper, and with gold, silver, lead, and zinc, the mineral products were valued in 1940 at over £16,000,000. Horse and cattle rearing have made the Arizona cowboy famous. There are 2,271 m. of rly. and 3,825 m. of highway.

The state senate has 19 members and its house of representatives 58; the chamber meets biennially. Two senators and two representatives are returned to Congress. Phoenix is the capital city, and Tucson the seat of the university opened in 1891. There are 14 counties. Arizona was settled by Spaniards in 1732 and was part of Mexico until 1848, when it was mostly acquired by the U.S.A. Rounded off by the Gadsden Purchase of 1853, organized as a territory in 1863, it became the youngest state of the Union, Feb. 14, 1912. Pop. in 1940, 499,261, of whom 55,076 were Indians.

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Arjish OR ARGESH. River of Rumania, also called the Argesul (*g.r.*).

Arjish Dag. Turkish name of an extinct volcano in Asia Minor, also known as Mt. Argæus. See Argæus, Mount.

Ark OF NOAH. The contemporaries of Noah, the son of Lamech (Gen. 5, 28), who was called a just man (6, 9), are described in the O.T. as having become so degraded and vicious that God determined to destroy the whole generation by a great flood or deluge. He decided, however, to spare Noah, his wife, his three sons and their wives. Noah, therefore, was instructed to construct an ark which should serve as a kind of ship, in which he and his family and a certain number of every kind of animal could take refuge (Gen. 6, 14-21).

Thus the Ark of Noah seems to be thought of as a flat-bottomed vessel. It was to be made of gopher wood, perhaps cedar or cypress, to be provided with rooms (Heb., nests) for the men and animals, and to be smeared within and without with pitch (Gen. 6, 14). It was to be in three storeys, and to have a light (Heb. *tschar*, either a window or a roof) and a door (*v. 16*). The measurements are given as follows: 300 cubits long, 50 cubits broad, and 30 cubits high (*v. 15*). If, as seems likely, a cubit is here equivalent to 1½ ft., these figures would represent 450 × 75 × 45 ft.

Ark OF THE COVENANT. Sacred chest of shittim or acacia wood, made by the Israelites according to the command of the Lord as given to Moses (Ex. 25). Called the Ark of the Covenant in Josh. 3; Ark of the Covenant of the Lord, Num. 10; Ark of the Covenant of God, Judg. 20; Ark of the Testimony, Ex. 25; Ark of God, 1 Sam. 3; Ark of God of Israel, 1 Sam. 5; and Ark of the Lord God, 1 Kings 2, it contained the Tables of the Law and was placed in the most holy place of the Tabernacle and of the first Temple. It was the most solemn emblem of the Jewish faith, and the waters of the Jordan divided at its approach (Josh. 3). After being set up at Gilgal, the Ark was removed to Shiloh, and later fell into the hands of the Philistines, who returned it with gifts (1 Sam. 4-7). Its final resting-place was Jerusalem, where it was placed in the Temple (1 Kings 8; 1 Chron. 15). It is believed to have been destroyed when the Temple was burnt by the Babylonians. Despite Jer. 3, 16, there is a Jewish tradition that it will be restored at the coming

of the Messiah. Monuments have been found in Egypt containing representations of sacred chests resembling the Hebrew ark. The word ark as applied to the Ark of the Covenant is from a Hebrew root different from that used to define the ark of Noah.

Arkaig. A lake in Inverness-shire, Scotland. It is 10 m. N. of Fort William, 12 m. long, and nearly one m. wide.

Arkansas. River of the U.S.A. Rising in central Colorado, it flows E. and S.E., through the Royal George cañon, traverses Kansas, Oklahoma, and Arkansas, and joins the Mississippi at Napoleon. Next to the Missouri, it is the largest tributary of the Mississippi. Its chief affluents are the Cimarron and Canadian rivers, its drainage area is about 187,000 sq. m., and it is about 2,000 m. long.

Arkansas. S. central state of the U.S.A., bounded N. by Missouri, E. by Tennessee and Mississippi, S. by Louisiana, W. by Texas and Oklahoma. It is 250 m. long, 175 to 275 m. broad, and covers 53,102 sq. m. The surface is swampy and well wooded to the E., where the Mississippi river forms a natural boundary, hilly in the N.W. and W., and centrally and S. an undulating tract. Navigable rivers include the Arkansas, Red, White, Washita, and S. Francis. Serious floods have occurred, a fifth of the state being inundated in 1927.

Of the gainfully employed, over half are in agriculture. Cotton brings half the income from farm products, and in 1940 the state output was second to that of Texas. Arkansas yields a fifth of the nation's rice. Maize and livestock are important. Two-thirds of the land area is forest, Ouachita and Ozark being national forests. Arkansas has the only diamonds in N. America and nearly all the nation's bauxite (23 p.c. of the world's). Industrial products include lumber, cotton seed oil, cake, meal, linters; and refined petroleum, 24,000,000 gallons being yielded in 1939 where none was worked in 1921. There are 4,537 m. of rly., 9,483 m. of roads.

The state senate has 35 members and its house of representatives 100; the chamber meets biennially. Two senators and seven representatives are returned to Congress. Little Rock is the capital and Fayetteville the seat of the university founded in 1871. There are 75 counties.

De Soto in 1541 was the first European to arrive, but Arkansas

was not settled until 1686. Acquired from France in 1803, organized as a territory in 1819, it joined the Union on June 15, 1836. A State Planning Board was set up in 1935. Pop. in 1940, 1,949,387, of whom 482,578 were negroes. William Grant Still, the negro composer, was a native. Pron. Ar'-kansaw.

Arkite. Nitroglycerine safety explosive permitted for use in Britain. A second variety known as Arkite No. 2 was introduced to pass the more stringent Rotherham test for safety explosives, the compositions being shown below:—

Ingredients.	Arkite	Arkite No. 2
Nitroglycerine ..	52.5	32.0
Nitrocellulose ..	3.0	1.0
Potassium nitrate ..	22.0	27.0
Chalk ..	0.5	—
Wood meal ..	7.0	10.0
Ammonium oxalate ..	15.0	30.0

Arkite No. 2 passed the test with a charge of 40 oz. The nitrocellulose is dissolved in the nitroglycerine, forming a thin jelly, which is mixed with the other dry ingredients in an incorporator of the type used for making blasting gelatine. The chalk neutralises any acid evolved on storage the wood meal retains the jelly, and the ammonium oxalate is employed to reduce the temperature of the flame.

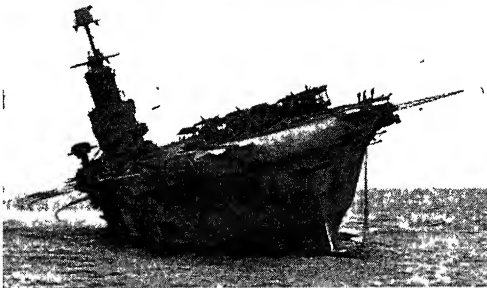
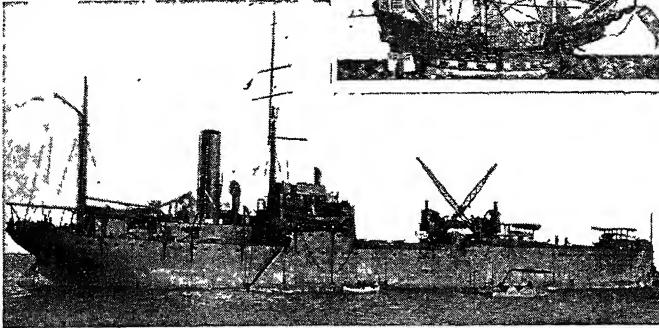
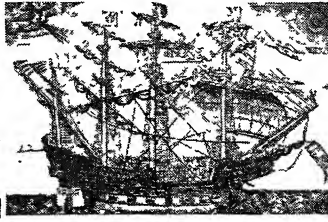
Arklet. Small lake of Stirling-shire, Scotland. Its water has been raised 22 ft. by means of a dam 1,050 ft. long, and is conducted by a tunnel into Loch Katrine, whence it is conveyed to Glasgow.

Arklow. Market town and seaport of co. Wicklow, Eire. It stands at the mouth of the Avoca, 49 m. S. of Dublin by rly. It has herring fisheries and oyster beds, manufactures explosives, and is largely engaged in the shipment of copper and lead obtained from the neighbouring mines. Traces remain of the castle of the Ormondes, which was razed by Cromwell in 1649. Arklow was captured by the British in 1281, and was the scene of battles in 1316 and 1331. During the insurrection of 1798 the rebels sustained a heavy defeat near Arklow Bridge.

Arkose. Arenaceous deposit formed mainly of felspathic and other waste produced by the denudation of igneous rocks, especially of granite. It may be compact and cemented, or friable, and it occurs interstratified with the normal sediments of many geological formations.

Ark Royal, H.M.S. British aircraft carrier (22,000 tons), completed in 1938. The Ark Royal

was the third ship of her name in naval annals. The first was built at Deptford for Sir Walter Raleigh in 1587. She became the flagship of Lord Howard of Effingham and took part in the destruction of the



Ark Royal. Three warships of this name: top, the largest ship (800 tons) of Queen Elizabeth's navy; centre, original seaplane carrier, 1914; bottom, sinking of the third Ark Royal, Nov., 1941. See also p. 193
Bottom photo, British Official, Crown copyright

Spanish Armada. The name was revived in 1914 when the Admiralty chose it for the first seaplane carrier. The third Ark Royal became almost a legend during the Second Great War. Germany claimed to have destroyed her off Norway by bombing attack in Sept., 1939, and several times afterwards. This famous ship took part in the hunt for the Admiral Graf Spee (*q.v.*) in the S. Atlantic and later served as a base for aircraft engaged in the Norwegian campaign of 1940. She was at Oran in action against the French fleet, July, 1940; in the Mediterranean against the Italian fleet, July 9, off Sardinia, Nov. 27, when her aircraft delivered a torpedo attack on Italian battleships. She also took part in an attack on Genoa, Feb. 9, 1941; and the German battleship Bismarck was successfully attacked in the Atlantic by her aircraft on May 26, 1941. On Nov. 13, 1941, she was torpedoed by a German submarine in the Mediterranean not far from Gibraltar, whither

she was returning from a cruise. It was hoped to get her safely into harbour, but while in tow she took a list and sank, 14 hours after having been hit. Out of a complement of 1,600, only one man was lost. One of the best-known ships in the Royal Navy and built at a cost of £2,330,000, the Ark Royal took three years

and three months to complete; she sailed 205,000 miles and had been engaged in 32 war operations.

The building of a fourth Ark Royal, a larger aircraft carrier, was begun at Birkenhead in 1944.

Arkwright, Sir RICHARD (1732-92). Inventor of the machinery which made possible the great cotton industry of today. Born at Preston, Lancashire, Dec. 23, 1732, of humble parentage, he was apprenticed to a barber, and, having learned his trade, started in business in Bolton. He was fairly successful as a barber, and added to his income by dealing in human hair, those being the days when wigs were generally worn.

While he travelled about the country for the purpose of buying hair, Arkwright became interested in the slow and clumsy processes

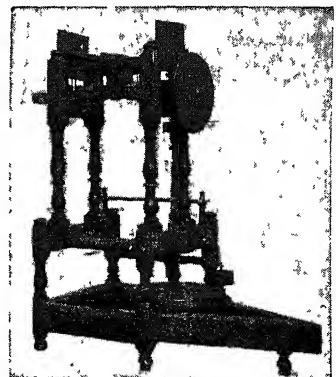
then employed for spinning and weaving cotton. He himself had little or no mechanical knowledge, but he sought out those who had, and, forsaking hairdressing, turned his attention to the design and construction of a spinning machine. With the help of John Kay and John Smalley, one was put together at Preston, and when it was perfected Arkwright obtained a patent and took it to Nottingham, where he built a factory and began to spin cotton. Soon, however, the need of water-power induced him to transfer his business to Cromford, in Derbyshire. This was in 1771, and Arkwright's position was now made. His invention quickly proved its utility, and the industry went ahead by leaps and bounds, especially after the duty on cotton goods had been reduced.

The third and last period of Arkwright's life was harassed by numerous law-suits, which he was compelled to bring in order to protect his patents, and by the destruction by rioters of his mill at Chorley. In the courts the main case was decided against him in 1785, and the patents were cancelled, but even this blow did not seriously retard the prosperity of his undertakings. In 1790 he introduced steam-power into one of his factories. In 1786 Arkwright was knighted, and before his death, Aug. 3, 1792, he had begun to build the castle at Willersley, Derbyshire, where his descendants have since resided.

Arlberg OR ADLERSBERG. Branch of the Rhaetian Alps, Austria, on the border-line of Tirol and Vorarlberg. The Arlberg Pass, 5,890 ft., is a carriage road and connects Stuben with St. Anton. The Arlberg rly. tunnel, constructed 1880-83, is 6½ m. long and ascends to a height of 4,300 ft.



Sir R. Arkwright,
British inventor



Arkwright's spinning machine, the original one made by him in 1769

Arlen, Michael (b. 1895). British novelist. Born at Rustchuk in Bulgaria, of Armenian parents, his name was Dikran Kouyoumdjian, which he changed by deed poll in 1922, becoming a naturalised British subject. He was educated at Malvern College. Arlen wrote popular novels and



Michael Arlen,
British novelist

short stories dealing with the life of Mayfair; best known were *The Green Hat* and *These Charming People*, later dramatised.

Arles. Town of S.E. France, in the department of Bouches-du-Rhône. Standing on the Rhône, 53 m. by rly. N.W. of Marseilles, it is connected by canal with the Mediterranean. Arles has a little shipping, and flour, silk, hat, and shipbuilding industries, and is also a market for local produce. The 7th century Romanesque church of S. Trophimus, once a cathedral, was restored about 1870, but retains some of its early features. Other notable buildings include the 17th century hôtel de ville and the museums, all on or near the Place de la République.

Arles, the ancient Arelate, was an important place in Roman times, and even earlier, its most flourishing period being in the 4th and 5th centuries, when the emperors resided here. An episcopal see from the 1st century until 1790, its bishop was the primate of Gaul, and several important church councils were held in the city. Roman remains include the ruins of an immense amphitheatre, an imperial palace, a theatre, baths, a cemetery, a forum, and an aqueduct. In the 10th century it was the capital of the kingdom of Arles or Burgundy. In 1032 this was joined to Germany, and for a time Arles was an imperial free city. Then, as part of the district known as Provence, it passed by marriage to the house of Anjou and so to the crown of France. See Burgundy.

In the Second Great War, bridges over the Rhône at Arles were the targets for U.S. heavy bombers on July 17, 1944, and on Aug. 25 the city was liberated by French troops fighting with the Allied forces. Pop. 32,485.

Arles (Latin *arria*, earnest money). Term in Scots law. It

has the same meaning as the English word earnest—i.e. something given to bind a bargain.

Arlington, Henry Bennet, Earl of (1618–85). An English politician. He was educated at Westminster and Christ Church, Oxford, joined the Royalists at the outbreak of the Civil War, and in 1658 went to Madrid as Charles's agent. At the skirmish at Andover he received a wound on his nose, the scar of which remained visible for the remainder of his life. After the Restoration he was made keeper of the privy purse and in 1662 secretary of state. He was raised to the peerage in 1663, was a member of the Cabal ministry, and in 1674 was unsuccessfully impeached as the "conduit-pipe" of Charles's policy and resigned the office of secretary of state for that of lord chamberlain. He died July 28, 1685, and was buried at Euston, Suffolk. His policy was directed to making the Crown absolute, and to freeing the ministers of the Crown from responsibility to Parliament. Arlington Street, London, is built on the site of Goring House, where he resided. Consult *Life*, V. Barbour, 1917.

Arlington National Cemetery. Burial ground of United States soldiers. Originally part of the estate of the Lee family, it covers an area of some 400 acres in Virginia, on the banks of the Potomac, facing Washington, D.C. The fine mansion was formerly the home of Robert E. Lee (*q.v.*). On his departure to the American Civil War in 1861, it was occupied by Federal soldiers, and later it was used as a military hospital. In 1864 the first soldier was buried there, a Confederate who had died in the hospital. Since then the bodies of more than 25,000 U.S. soldiers, slain in every war in which the U.S. has taken part, have been laid there. A granite sarcophagus covers the bones of 2,000 unknown soldiers gathered mainly from the Civil War battle-

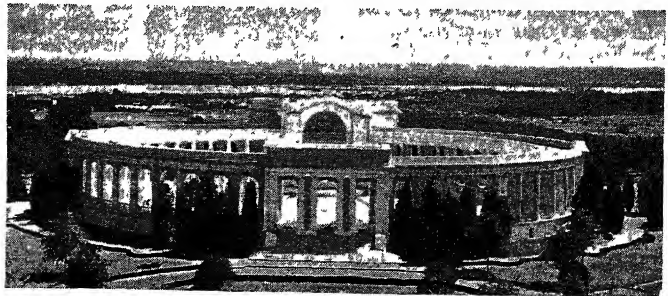
field of Bull Run, and there is also the tomb of the Unknown Soldier, a great block of marble bearing a tribute to the unidentified American dead in the First Great War. A memorial amphitheatre adjoining was dedicated in 1920. The British field-marshal, Sir John Dill, is buried here.

Arliss, George (1868–1946). British actor. Born in London, April 10. 1868, the son of William Andrews, printer and publisher, he adopted Arliss as his stage name. His first stage appearance was at the Elephant and Castle Theatre, Sept. 18, 1886, in *Vidocq*, the French Jonathan Wild, and he subsequently played a variety of parts there. His first West End part was at Terry's Theatre, Jan. 21, 1890, and in the same year he appeared with Mrs. Patrick Campbell at the Royalty Theatre in Mr. and Mrs. Daventry. Travelling to America with Mrs. Campbell in 1901, he remained in the U.S.A. for 22 years, playing a wide range of parts. His film career, which made his name and appearance familiar to millions of people, began in 1920, and he became popularly identified with many of his most famous rôles, e.g. *Disraeli*, *Voltaire*, *Rothschild*, *Richelieu*, and *Wellington*. He died Feb. 5, 1946. Consult *George Arliss* by Himself, 1940.

Arlon. A town in Belgium, capital of the prov. of Luxembourg. It stands on a hill, 17 m. by rly. N.W. of the city of Luxembourg. The ancient Orolaunum, and at one time in the duchy of Luxembourg, it was seized by the French, who made it a fortress about 1670. Pop. 11,634.



George Arliss,
British actor



Arlington memorial amphitheatre, in America's national cemetery. Close by is the grave of an Unknown Soldier killed in the First Great War

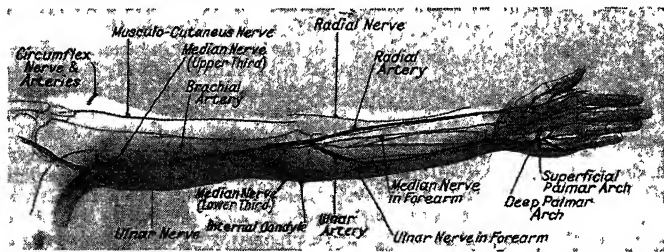
Arm (Greek *harmos*, shoulder joint). Limb extending from the shoulder of the human body to the hand.

The bones consist of: the *humerus*, or upper arm bone, which articulates at the shoulder joint with the *scapula* or shoulder blade; and the bones of the forearm, the *radius* and *ulna*, articulating with the *humerus* above to form the elbow joint, and with the carpal bones of the hand below to form the wrist joint, though the *ulna* is separated from the wrist bones by a fibro-cartilage. When the hand is held with the thumb pointing outwards away from the body, the *radius* and *ulna* are then parallel to the position which is known as supination, the *radius* being the outer. When, however, the hand is turned round so that the back of the hand points forwards and the thumb inwards to the body, the *radius* rides over the *ulna* into the position known as pronation

fingers; and a group of flexors of the hand and fingers which bend the hand forwards and close the fingers.

The main arteries are: the axillary artery; the brachial artery, which can be felt pulsating on the inner side of the arm just beneath the shoulder, and by pressure upon which hæmorrhage from the lower part of the arm can be controlled; the ulnar artery; and the radial artery, which, just before it reaches the wrist, forms the well-known pulse. The superficial veins of the arm are the radial, ulnar, median, basilic, and cephalic; the deep veins accompany the arteries of the same names.

The principal nerves are the circumflex, the cutaneous, the musculo-cutaneous, the median, the musculo-spiral, the ulnar, and the radial. Pressure on the ulnar nerve in the elbow gives rise to the sensation popularly described as being due to the "funny bone."



Arm. Front of the arm, forearm, and hand, with the bones outlined and the course of the most important nerves and arteries marked

The more important muscles are: the *deltoid*, attached above to the collar bone and shoulder blade and below to the upper part of the *humerus*, which raises the arm from the side and also assists backwards and forwards movement of the arm; the *biceps*, which is attached above to the *scapula* and below to the upper part of the *radius*, forming the principal muscle which raises the arm at the shoulder joint and bends the elbow; the *brachialis anticus*, attached to the lower part of the *humerus* and the upper part of the *ulna*, also bending the elbow; the *triceps*, forming most of the muscular part of the back of the arm, being attached above to the *scapula*, in the centre to the *humerus*, and below to the *ulna*, and acting mainly by straightening the elbow; the *pronator radii teres*, arising from the *humerus* and *ulna* and passing into the *radius*; the *supinator longus*, passing between the *humerus* and the *radius*; a group of extensors of the hand and fingers, which bend the hand backwards and open the

Fracture of the shaft of the *humerus* is usually due to direct violence, but sometimes to some severe muscular effort, such as throwing a cricket-ball or clutching at a support to prevent a fall. Fracture of the tip of the elbow or olecranon process is not uncommon. The two bones of the forearm are more frequently broken together than is either the *ulna* or *radius* alone. Fracture of the lower end of the *radius*, known as "Colles' fracture," is a frequent accident, most often due to putting out the hand to break a fall.

Armada or **ARMADO**. Spanish word meaning originally any armed force. It was applied then to a fleet, and especially to the fleet sent against England by Spain in 1588, which was known as the Great or Spanish Armada.

In 1586, after many years of informal hostilities, England and Spain were at last openly at war, and an English army was officially supporting the revolt of the Netherlands. Philip II resolved on the early destruction of Eliza-

beth, and set about the preparation of a mighty fleet.

Delay was first imposed upon Philip by Sir Francis Drake's great raid in April, 1587, when he "singd the king of Spain's beard" by burning most of the shipping and stores in the harbour of Cadiz. The Armada was not ready to sail until the late autumn, and then the admiral, Santa Cruz, refused to face the storms of the Channel. Before winter was over Santa Cruz was dead, and the command of the expedition was assigned to a landsman, the duke of Medina Sidonia. So the fleet did not put out until the end of May, and then storms drove it back to port. It set sail finally on July 12, 1588, and on July 19 was sighted off the Scillies by an English scout. The number of ships in the Armada was between 127 and 130. The soldiers on board numbered about 20,000.

The English fleet had been ready in Feb. Of the 197 craft which took part in the operations a large proportion were quite small vessels, and the tonnage of the bigger ships was much less than that of the Spaniards. Only 50 were of more than 200 tons, while of the Spaniards 62 exceeded 300 tons. In the number of men and guns the Spaniards doubled the English; but the English ships were constructed to deliver broadsides, while the Spanish ships were not.

The bulk of the fleet was stationed at Plymouth; another squadron watched the E. end of the Channel in case of any attempted movement from the ports of the Netherlands on the part of Parma, whose army was waiting to be landed in England. Medina Sidonia's orders were to sail up Channel to the Netherlands ports and to embark or convoy Parma's army to the English shore.

On the news of the approach of the Spanish fleet, July 19, the English at Plymouth, under the command of Lord Howard of Effingham, whose principal subordinates were Drake, Hawkins, and Frobisher, made out to sea by night, crossing the course of the approaching Spaniards so as to secure the weather gage. Next morning the Spaniards appeared, sailing massed in the form of a crescent. The English, sailing in line ahead, passed them on the flank and rear, pouring in broadsides as they passed and suffering little damage themselves. Two

determined efforts were made to force a general engagement—the first, off Portland, July 23, failed; the second, off the Isle of Wight, July 25, was only partly successful.

The Spanish fleet still pushed up Channel, its mass unbroken, though the English gunnery had wrought heavy execution among the Spanish soldiers, had done serious damage to many of the ships, and had shaken the morale of the Spaniards without appreciable loss to itself. On the night of July 27 the Spaniards anchored in Calais Roads. On the next night fireships were drifted down upon them by the English, creating a panic. They cut their cables and fled helter-skelter N.E., and in the morning were scattered far and wide along the coast. The English fell upon their rear off Gravelines and sank or destroyed a number of ships. The Spaniards were quite unable to re-form; their last chance was destroyed by a gale bursting, and they headed N. with the English in pursuit. The fight off Gravelines, July 29, 1588, completely shattered the Armada and sealed its fate. The fleet was not utterly destroyed by the English because the English ammunition had run out and the English ships went back to the Channel. It was annihilated by the storms, which dashed the already battered and crippled vessels upon the coasts of Scotland and Ireland on their way home. It was perhaps fortunate that the untrained army which Elizabeth mustered at Tilbury was not called upon to join battle with the Spanish veterans on land. The commemorative medal bore the words *Dominus flavit et dissipati sunt*—the Lord blew and they were scattered.

The overthrow of the Armada signalled a maritime revolution. English seamen had always more than held their own in the narrow seas, but hitherto English fleets had not been matched with the more celebrated fleets of the Mediterranean States; it was only the English and Spanish sailors who knew before 1588 that in seamanship, in manoeuvring, and in gunnery the English were far superior to their adversaries. The great sea-fights had been won by ships which were floating castles crowded with soldiers. Drake and Hawkins taught Englishmen to use their ships themselves as instruments of war, not fighting in close masses in line abreast, but in line ahead, ship following ship and smashing the enemy's hulls

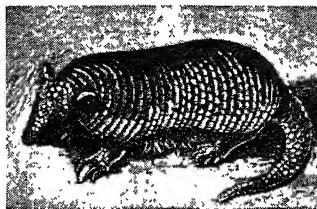
with broadsides, grappling only when the ship's guns had done their work. The conflict with the Armada displayed the new tactics on the grand scale, and placed England firmly at the head of the maritime nations.

A. D. Innes

Bibliography. State Papers Relating to the Defeat of the Spanish Armada, ed. Sir J. K. Laughton, 1894; Drake and the Tudor Navy, J. S. Corbett, 1898; Hakluyt's Voyages, one vol. edn., 1930.

Armadales. Police burgh and town of West Lothian, Scotland. It is 2½ m. W. of Bathgate by railway, and has large iron and steel foundries, and brickworks. Pop. 4,854.

Armadillo (Spanish diminutive of *armado*, armed). Mammal of the family Dasypodidae, included with



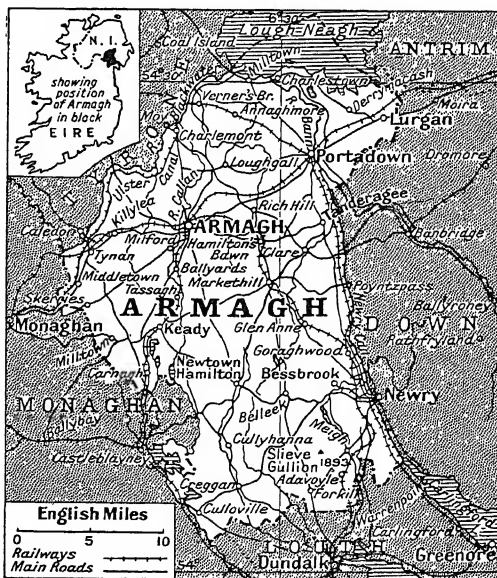
Armadillo. *Priodon gigas*, or the giant armadillo of South America

sloths and anteaters in the misleadingly named order Edentata (toothless). It is a burrowing animal, with powerful digging claws, and inhabits the forests and pampas of S. and Central America. The characteristic feature suggesting the name is the protection of the body by bony plates embedded in the skin, to which are attached external horny scales. This armature takes the form of two large shields, one covering the shoulders and anterior part of the back, the other the hind quarters. Between these are flexible girdles, protected by scales, which enable the armadillo to roll up like a hedgehog. The head, tail, and limbs are similarly protected by bony tubercles or rings. The

pichichiago or fairy armadillo is only 5 or 6 ins. in length; the priodon or giant armadillo measures 3 ft. from snout to base of tail, and the tail is about 20 ins. Armadillos feed mainly on ants, termites, beetles, and other insects, but they also eat snakes, snails, and carrion. Their flesh is esteemed as food by the natives.

Armageddon OR HAR-MAGEDON (Heb., mountain or mountain district of Megiddo). Scene of the battle between the forces of good and evil which, according to Rev. 16, is to precede the millennial reign of Christ on earth. It is usually identified with el Lejjun, the Legio of the Romans, on the W. edge of Esdraelon, but the suggestion has also been made that the site is that of Megiddo 10 m. from Jenin. It was the scene or near the scene of the defeat of the Canaanites by Barak (Judges 4), of the Midianites by Gideon (Judges 7), of the death of Saul in the Philistine invasion (1 Sam. 31), and of the death of Josiah in the Egyptian invasion (2 Kings 23; 2 Chron. 35). Possibly Magedon may be the name of a Sumerian deity of the lower world, who engaged in conflict with a rival deity on a hill afterwards called the hill of Magedon. In popular usage the name Armageddon is applied to a battle or campaign involving great slaughter. See Megiddo.

Armagh. Inland co. of Northern Ireland, smallest of the six. It has a greatest length N. to S.



Armagh. Map of the small inland county of Ulster

of 32 m., greatest breadth of 20 m., and an area of 489 sq. m. Hilly in the S. and S.E., where the highest summit, Slieve Gullion, reaches 1,893 ft., the surface is generally undulating while it recedes towards Lough Neagh (partly in the county), and mainly bogland in the N. Agriculture and linen manufacture are the chief industries. The salmon fisheries of the Bann and Blackwater, the chief rivers, are important. Oats and potatoes are grown, and cattle, sheep, and pigs are reared.

The railway traverses the county, while additional communication is afforded by canals. Armagh is the county town, and others are Lurgan (birthplace of G. W. Russell, poet and economist, better known as A.E.), Portadown, Bessbrook, and Tandragee. The county returns one member to the Imperial parliament at Westminster and four (representing separate constituencies) to the parliament of Northern Ireland. Armagh contains many relics of antiquity, among them being Danes Cast, a large defensive work in the S.E. on the co. Down border: Tyrone's Ditches, near Poyntzpass; and a number of cairns and tumuli. Pop. 112,029.

Armagh. City, market town, and co. town of Armagh, Northern Ireland. It is 35 m. S.W. of Belfast by railway. It is the seat of a Protestant archbishop (primate of all Ireland) and of a Roman Catholic archbishop (cardinal of all Ireland). There are two cathedrals and two archiepiscopal palaces. The Protestant cathedral, a 13th century cruciform edifice rebuilt in 1765, is supposed to occupy the site of the 5th century church of S. Patrick. The Roman Catholic cathedral, begun in 1840, was consecrated in 1873. Armagh is famous for its observatory, founded 1790. Linen weaving is the principal local industry. Market days, Tues., Wed., and Sat. Pop. 7,064.

Armagh, or Ard-magha, meaning high field, is of great antiquity, and in 448 was the meeting-place of a synod, an interesting relic of which is the Book of Armagh, now in Trinity College, Dublin. For many years the metropolis of Ireland, it was famed for its theological and literary college. Entered by Brian Boru, who is

buried here, in 1004, it again fell before Edward Bruce in 1315, and here Shane O'Neill met first with defeat and later with success.

Armagnacs. Name of a faction in France which came into existence about 1396. It was first known, from the name of its leader, as the Orlanist party, but later, under Bernard, count of Armagnac, it took a new name. In opposition to the Burgundians, the Armagnacs then became the national party of France, and remained so until the treaty of Arras in 1435. The name was afterwards given to bands of adventurers, also called Écorcheurs. The former prov. of Armagnac gives its name to a famous brandy.

Armament. General term for fighting apparatus. It is applied to munitions of war, naval, military, or air, and especially to the guns on aircraft or a man-of-war or coast forts; and to a military or naval force equipped for war. See Armour; Artillery.

Armatoles (mod. Gr., bearers of arms). Name given in the 16th century to bodies of rebellious Greeks who took service under their Turkish conquerors. In return for certain privileges and possessions, they undertook to protect their districts from the Klephts or mountain brigands. In the 18th century the Armatoles broke with the Turks, and they were last heard of in 1830 during the Greek war of independence.

Armature. (1) In a magnet system, the member attracted by the magnet poles. (2) In a dynamo or motor, the rotating member. In the electric bell the armature is a strip of soft iron, free to vibrate near the poles of the electro-magnet; at its end it carries the hammer which strikes the gong when the armature is caused to vibrate by the passage of an electric current through the magnet coils. The armature of a motor or dynamo comprises the shaft, on which is fixed the core (composed of laminations of thin mild steel so shaped as to provide

slots in which are wound the coils), and which carries at one end the commutator. The latter consists of copper segments, insulated from one another, and built up in the form of a cylinder. Each segment is permanently connected to one coil of the armature. The function of the commutator, with the brushes that bear upon it, is to change the direction of the currents in the armature winding. Thus, in a dynamo, the currents are caused to follow always the same direction in the external circuit: in a motor, the commutator acts so that the turning force is always in the same direction. See Dynamo; Generator; Motor.

Armavir. Town of Russia, in the Azov-Black Sea area. Founded 1848, it stands on the Kuban river, 40 m. W. of Stavropol, is a junction on the Caucasian Rly. and the starting-point of the rly. to Tuapse on the Black Sea. An important trading centre, it is also an oil-refining centre, being on the pipeline from the Maikop oilfield, 50 m. S.W. Captured by the Germans, Aug. 12, 1942, in their advance towards Maikop from Manych, it was retaken by Soviet troops on Jan. 23, 1943. Pop. 83,677.

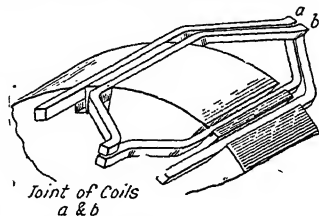
Armed. In heraldry, any animal whose horns, tusks, teeth, beak, claws, or talons are of a different tincture to the body is said to be armed of that metal or colour.

Armed Liner. Vessel normally engaged in carrying passengers or cargo, but taken over by its Government in case of emergency and fitted out and commissioned as a regular unit of the national fighting force. It is to be distinguished from an armed merchantman and a privateer. International law recognizes the right of the merchant vessel to defensive armament; during the First Great War merchant ships of 3,500 to 7,000 tons carried two 4-7-in. guns, while vessels over 7,000 tons had two 6-in. guns. Some years before the outbreak of the Second Great War defence courses were arranged for training Merchant Navy officers in gunnery, etc., and for teaching seamen to be gunners. Later the D.E.M.S. (Defensively Equipped Merchant Ships—*q.v.*) organization was set up, with bases at home and abroad. The guns were manned by personnel of the Royal Maritime Regiment (*q.v.*). See also Auxiliary Cruiser.

Armed Neutrality. The name given to a league formed by most of the maritime powers in 1780.



Armagh city arms



Armature. How coils (shown as solid copper strips) are joined. Each coil joint may be connected to a commutator segment

At that time Great Britain was at war simultaneously with the American colonies, France, and Spain, and the object of the league was to resist the British doctrines of the rights of belligerents in their treatment of neutrals at sea—doctrines which told in favour of the power which enjoyed naval ascendancy. The prime mover was the tsaritsa, Catherine of Russia, who was joined by Denmark, Sweden, Holland, Prussia, Portugal, and Naples. The critical questions at issue were formulated in the demand of the neutrals that the declaration of a blockade should not be recognized unless the blockade was effective, and that all goods other than contraband of war carried in neutral vessels should be free from seizure; the high-handed methods by which Great Britain enforced the right of search being the fundamental cause of complaint. At the end of 1800, when Great Britain was left isolated in her struggle with France, the Armed Neutrality was revived as a league between the Baltic Powers by Tsar Paul I, but was dissolved some three months later after the battle of the Baltic and the death of the tsar.

Armenia. One of the Soviet Socialist Republics. It is bounded N. by Georgia, E. and S.W. by Azerbaijan, S.E. by Persia, W. by Turkey. The area is 11,945 sq. m. Proclaimed Nov. 29, 1920, the republic formed with Georgia and Azerbaijan the Transcaucasian Soviet Federal Socialist Republic from 1922 to 1936, in which year it achieved separate status. It scarcely coincides at all with the Armenia of history, some of which is now in Turkey. There are nine administrative districts, including those of Erivan, the capital, Echmiadzin, the old patriarchal

seat, and Leninakan, formerly Alexandropol. The pop. in 1939 was 1,281,600, a mixture of Armenians (85 p.c.), Russians, and Turco-Tatars.

The country is largely a plateau, between 6,000 and 8,000 ft. high, but includes volcanic mts. near Leninakan and round Lake Gokcha, Alagos reaching 13,236 ft. As the tablelands suit pastoral life, there are many shepherds and herdsmen, who lead a hardy life in a dry and rigorous climate. Agriculture thrives in the Aras valley on the S.W. border; the cultivated area is about 1,850 sq. miles, and cotton, tobacco, rice, fruits, and vines are widely grown. The principal irrigation work is the Shirak Lenin canal of 13 m. Hydro-electric power is in use. Other industries include copper and lead mining and camel breeding. A rly. serves the Aras valley and forks at Leninakan, W. to Kars in Turkey, E. to Tbilisi in Georgia; otherwise communications are primitive. There are 1,161 primary, 317 secondary, 9 higher, and 51 technical schools and colleges. A society exists for maintaining cultural relations with foreign countries, and a House of Culture of Soviet Armenia has been opened in Moscow.

In modern times until 1917–18 the term Armenia was given generally to the territory comprised within the six provinces of the Turkish empire in the E. half of Asia Minor known as the Armenian vilayets, and the S. part of Caucasia which by 1917 had mostly belonged to Russia for about 40 years and was governed by the viceroy of the Caucasus. To these Turkish and Russian districts was usually added the N.W. corner of the Persian province of Azerbaijan; the connecting link of all

three being physically Mt. Ararat. The oldest name of the country indeed was Ararat or Urardhu. The inhabitants called themselves Hais, after Haik, supposed to have been their first king; the Persian name for Armenia was Hajastan. According to some, the word Armenia is derived from Aram, the sixth king after Haik; the Medes spoke of Arminia, the Romans of Armenia Major and Armenia Minor, the former covering roughly the territory mentioned above and the latter being the province of Cilicia. Throughout history there was a considerable shifting of the boundaries of Armenia owing to the country being swept by Assyrians, Babylonians, Persians, Romans, Arabs, Turks, and Russians; but the people, who are of Indo-European stock, retained, like the Jews, their national characteristics.

Their language, as well as their religion, has had much to do with this. The Gregorian Church, though in some respects it resembles the Greek Church, has an individuality all its own. The classical form of

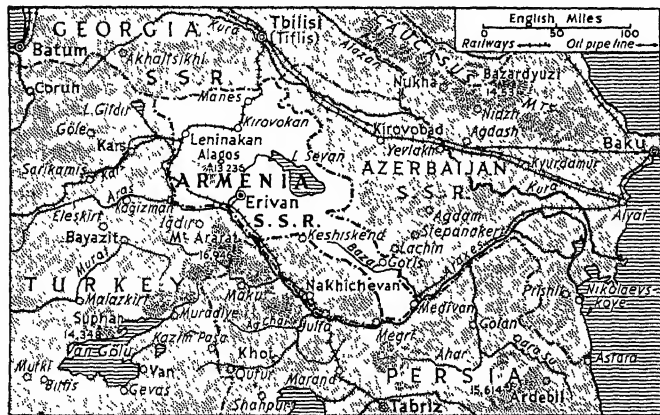
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Armenian alphabet as used in ordinary books. The characters were invented by Mesrob in the 5th century

the language was stereotyped by Mesrob and Sahak's translation of the Bible in the 5th century; the modern and much less pure form has adopted words from Turkish and other languages. The Armenians also have an alphabet peculiar to themselves, consisting of 38 letters, particularly strong in consonants. With such a broken record as a nation the Armenians have no outstanding literature; what exists is mostly concerned with history and theology, one of the chief works being a History of Armenia by Tchemochean, which was published in Vienna in 1784–86, and brings the story to the middle of the 18th century.

Ancient records show that Armenia was an organized state, with cities and armies, as far back as 600 B.C. Xenophon writes of an Armenian prince named Tigranes, who was the "right arm" of Cyrus the Great; and another Tigranes (95–55 B.C.), whose power alarmed the Romans, was conquered by them. But repeatedly, as Armenia lay across the highroad of vast human migrations E. to W. or W. to E., its independence was



Armenia. Map showing the boundaries of this republic of the U.S.S.R.



Armenia. Typical peasants of a suffering race. The men are herdsmen and live a rigorous life in the highlands

jeopardised or lost temporarily. In the 3rd and 4th centuries Armenia became Christian through the teaching of S. Gregory the Illuminator, the king Tiridates being baptized and many of his people with him. Gregory was the first catholikos, or ecclesiastical head, of the Armenian Church, which is often called after him the Gregorian Church, and his seat was at Echmiadzin. The occupant of this see has remained a leader, sometimes even politically, of Armenians all over the world.

Mahomedanism and the rise of the Caliphate were inimical to Armenia, and it fell a prey to the Persians and the Arabs, but in 885 Armenia Major had a strong native king in Ashod I, of the family of the Bagratides, and it was once more a prosperous country, with its capital at Ani between Echmiadzin and Kars. Gradually its power was sapped by internal strife, till in 1242 the Mongols conquered and devastated the land. During the Middle Ages the Armenians, as Christians, bore the brunt of numerous fierce struggles between Christian and Mahomedan armies. Armenia was the battleground of the Persians and the Turks from the 15th century up to the first quarter of the 19th century, the Turks getting the upper hand more and more in the conflict for its possession.

The Armenian Massacres

Up to the middle of the 19th century the Armenians formed a majority even in Turkish Armenia. When they had the opportunity they proved capable men, becoming the bankers and chief traders in their respective districts—for which the Turks hated them the more. During the reign of Abdul Hamid II (1876-1909) many thousands of Armenians were massacred, in spite of the efforts of the Great Powers. The people suffered

even more cruelly under the regime of the Young Turks in 1909, when 20,000 perished in the Adana massacres; and in 1915 Talaat Pasha and Enver Pasha, leaders of the Young Turks, made extermination of the Armenians a part of their policy, with the result that 800,000 died. During the First Great War the number of

Armenians was further reduced by the loss in action of many who volunteered for the Allies or were recruited by the Turks. In 1919 it was estimated that in all Turkish and Caucasian Armenia the Armenians numbered about 1,500,000, and that elsewhere there were about 500,000, numbers having settled in Persia, India, Austria, Italy, Egypt, France, Great Britain, and America.

Russian Influence

In 1827 Russia took from Persia nearly the whole of the S.E. part of Caucasus, and 50 years later deprived the Turks of the S.W. part. The first conquest gave her Erivan, the second Kars and Ardahan. All Caucasus came under Russian rule; the election of the catholikos was made subject to the approval of the tsars. From 1914 the E. side of the six vilayets and Armenian Caucasus were the theatre of campaigns, and Armenian towns like Van and Bitlis were depopulated and left in ruins, while cities like Erzerum were partially destroyed. In 1916 the Russians conquered Turkish Armenia and brought some relief to the wretched inhabitants, but after the Russian Revolution and the withdrawal of

that country's forces, the Turks came back. Under the Treaty of Brest-Litovsk the Turks advanced in 1918 into S. Caucasus, and, despite the heroic resistance of the Armenians under Andranik and Nazarbekian, stormed Kars. Meanwhile the whole Caucasus was in a ferment, and one outcome was the establish-

ment of the Armenian republic. In Nov., 1918, the Turks retired under compulsion from the British, while the Armenians were still trying to hold them back, as well as their co-religionists and allies the Tartars.

In 1919 the Armenian delegates submitted to the diplomats at Paris a map with large boundaries including a Black Sea coastline; but the Powers rejected this demand. In May, 1920, Soviet Russia reappeared in Transcaucasia, and in Aug. the Treaty of Sévres recognized the independence of Armenia. See Ardahan; Erivan; Kars; Turkey. Consult Armenia and the Byzantine Empire, S. Der Nersessian, 1945.

Armenian Church. Christianity, which was introduced at an early date, was established in Armenia in the latter part of the 3rd century by S. Gregory the Illuminator, who became patriarch. Armenia was thus the first country to make Christianity the state religion. In the 5th century the Bible was translated from the Greek text into Armenian by Mesrob and others. The Church has been subject to several persecutions, and has been divided over the monophysite heresy and over the question of its relations with Rome. From the 14th century the old Armenian or Gregorian Church, with its close affinity in forms and polity to the Greek Orthodox Church, ceased completely to be in communion with Rome, and became exclusively nationalist. Its numbers are estimated at about 3,000,000. Its head or catholikos is always a monk. Legend makes the apostle S. Thaddaeus its founder. The monastic rule is that of S. Basil.

Armentières. Town of France, in the department of Nord. On the river Lys, 20 m. by rly. N. of Lens, it manufactures cloth and table linen, and trades in grain.



Armentières. Street of this pleasant French town, showing the Church of S. Vaast in the background

Photo, A. J. Insall

In the battle zone for all but a few weeks of the First Great War it was held by the British despite furious German attacks on the Ypres-Armentières line Oct.-Nov., 1914, and continued in their possession until on April 12, 1918, they evacuated it in the final German offensive for the Channel ports. It was reoccupied by the Allies in Oct., 1918. The town, known throughout the British army as Armenteurs, as in the vulgar army song, *Mademoiselle from Armenteurs*, was seriously damaged by continued artillery fire. During the Second Great War it lay in that part of France occupied by the Germans in 1940, until liberated by the British 2nd army on Sept. 6, 1944. Pop. 22,704.

Armes Parlantes. Armorial bearings with charges making punning allusion to the bearer's name. See Allusive Arms.

Armfelt, GUSTAV MAURITZ (1757-1814). Swedish general. He was born in Finland, and became the confidant of Gustavus III of Sweden. In 1802 he was sent as ambassador to Vienna by Gustavus IV. He commanded the Swedish troops in Pomerania, 1805-7, and on the Norwegian frontier, 1808. After the deposition of Gustavus in 1809, Armfelt took service under Alexander I of Russia and became the first governor-general of Finland. He died at Tsarskoe Selo (now Pushkin), Aug. 19, 1814.

Armidade. Town of New South Wales, Australia, in Sandon county. It is 313 m. by rly. N. of Sydney, and stands on the New England tableland 3,314 ft. high. The industries include pastoral and agricultural pursuits and the working of alluvial gold, antimony, and wolfram. Pop. 7,320.

Armilla. Latin name for a bracelet, used as an archaeological term in English. See Bracelet.

Armillary Sphere. Skeleton celestial globe made up of circular metal hoops representing the equator, the ecliptic, the tropics, the arctic and antarctic circles, and colures. It revolves on an axis and has a circumscribing wooden horizon. It was used until the 16th century for instruction in astronomy.

Arminianism. Doctrine of man's free will and salvation by faith. Taught by Jacobus Arminius

in opposition to the dogma of predestination to eternal salvation or eternal punishment taught by the extreme Calvinists, it gave rise to bitter controversy in Holland in the first half of the 17th century.

Immediately after the death of Arminius in 1609, his followers, of whom Simon Episcopius became the chief, addressed a remonstrance of five points to the States-General, hence their name of Remonstrants. Conferences were held at The Hague in 1610 and at Delft in 1613, without producing harmony. The States-General issued a decree to enforce toleration and suppress controversy, but the decree was ignored. Political differences added to the bitterness of the feud. Then the synod of Dort was convened. It sat from Nov. 13, 1618, to April 30, 1619, but as it was composed entirely of extreme Calvinists, Arminianism was condemned, and its adherents were imprisoned or banished for refusing to subscribe to the finding of the synod. Persecution did not cease until about 1630. As the Dutch Calvinists took extreme views of the teaching of Calvin, so the Remonstrants exceeded the limits of the teaching of Arminius, many of them moving towards a broader theology. In England, Laud and Tillotson were identified with the teaching of Arminius, and the Calvinist-Arminian controversy had its English counterpart in the differences between the Methodism founded by John Wesley and the Calvinistic Methodism of George Whitefield.

Arminius (17 B.C.-A.D. 21). German national hero. He belonged to the tribe of the Cherusci and became an officer in the Roman army. In A.D. 9 he led a revolt of the Cherusci against their Roman governor, Quinctilius Varus, whom he utterly defeated in the almost impassable Teutoburg Forest. In A.D. 16 he was defeated by Germanicus, but the Romans were obliged to withdraw. He was eventually assassinated—a victim of internal dissension. There is a colossal monument to Arminius, completed in 1875, on the Grotenburg, near Detmold, and a statue of him at New Ulm, Minnesota, U.S.A. The modern form of the name is Hermann.

Arminius, JACOBUS (1560-1609). The Latinised name of Jacob Harmensen, or Hermanns, Dutch theologian. Born at Oudewater, S. Holland, he studied at Leiden and Geneva, where he attended the classes of Theodore Beza. Returning to Amsterdam about 1588 he was ordained minister, and

became prominent as an eloquent and earnest preacher. Selected to champion the Calvinistic dogma of predestination against a



Jacobus Arminius,
Dutch theologian

recently published work by a layman named Koornheert, his study of this work gradually changed his views, and he became a supporter of the doctrine of free will, maintaining that his position was not incompatible with membership of the Dutch Reformed church. Cited before the ecclesiastical courts, he successfully defended himself, and in 1603 was appointed to a chair in the university of Leiden. He was now bitterly attacked by his colleague Gomarus, and by most of the clergy, and his students were generally excluded from appointments. After six years at the university, Arminius died, Oct. 19, 1609, before the meeting of the synod which had been summoned to settle the controversy, his end being hastened by the persecution to which he was subjected. Calvinism has given way to Arminianism in most Protestant communities.

Armistice (Lat. *arma*, arms; *sistere*, to put a stop to). Agreement between two belligerents to suspend hostilities temporarily, either for some local reason, e.g. to bury the dead and succour the wounded, or as a preliminary to negotiations for peace. Sometimes it is called a truce, and on one occasion "cease fire for three hours" was the term employed.

An armistice applies only to the troops under the immediate command of the officers who agree to it. A neutral zone is fixed and a road is indicated by which all communications between the belligerents shall take place while the armistice is in force. Espionage is not prohibited, and often one side or the other will unwittingly disclose the defences or else reveal some unsuspected weakness. A general armistice requires the ratification of the governments. A partial armistice involves a considerable area or a large force, and it may become necessary through exhaustion of the troops in a certain theatre, or the outbreak of pestilence or other cause which a local armistice would not remove; such truce does not contemplate a negotiation for peace.

A most notable armistice was that signed between Germany and

the Allies in France, Nov. 11, 1918. It was renewed three times before the Allied peace terms were presented to the German delegates, May 7, 1919.

The terms of the Franco-German armistice of 1940 were signed on June 22 in the forest of Compiègne by Gen. Huntziger for France and Gen. Keitel for Germany. The Germans decreed that hostilities should not cease until six hours after the Italian government had notified them that the Franco-Italian armistice had also been concluded. Hostilities between France and Germany ceased at 12.25 a.m. on June 25. The Franco-Italian armistice was signed near Rome on that date by Gen. Huntziger for France and Marshal Badoglio for Italy. Hostilities between France and Italy officially ceased exactly ten minutes after those between France and Germany.

Other general armistices of the Second Great War included those between Russia and Finland at the close of the 1939-40 conflict; between the British and Vichy French in Madagascar, Nov. 5, 1942; and between the Allies and Italy, Sept. 3, 1943. The Bulgarian request for an armistice with the Allies followed 5½ hours after her receipt of the Russian declaration of war, Sept. 5, 1944. The terms were signed in Moscow, Oct. 28. Meanwhile Bulgaria had declared war on Germany, Sept. 8. Rumania, who had fought with Germany against Russia from 1941, sought an armistice with the Allies which was granted Aug. 23, 1944. One of the conditions being an immediate break with Germany, Rumania declared war on her former ally only two days later.

Armistice Day, POPPY DAY, OR REMEMBRANCE DAY. Nov. 11 was so called in commemoration of the signing on that date in 1918 of the armistice which ended hostilities in the First Great War. Observance of two minutes' silence in remembrance of those who fell in that war was held throughout the British Empire at 11 a.m. on Armistice Day every year from 1919 to 1938. After a break in the official ceremonial during the years of the Second Great War, it was resumed in 1945. The idea was said to have been suggested by King George V. The beginning and end of the silence was customarily announced in London by the firing of maroons such as were used in the earlier war as air raid warnings, but had

also unofficially announced the end of fighting at 11 a.m. on Nov. 11, 1918. The second anniversary, in 1920, was memorable for the entombment of the Unknown Warrior (*q.v.*) in Westminster Abbey and the unveiling by King George V of the Cenotaph (*q.v.*) in Whitehall. From 1921 the day came to be associated with the purchase and wearing of artificial Flanders poppies made by ex-servicemen of the British Legion (*q.v.*) in aid of Earl Haig's British Legion Appeal fund. Although the official observance of the two minutes' silence was discontinued during the Second Great War the poppies were sold every year. Between 1921 and 1946 the total sum thus raised was £14,298,500, including £986,000 in 1945. The British Legion's Festival of Empire and Remembrance was inaugurated on the evening of Nov. 11, 1929, at the Royal Albert Hall, London, and became a traditional and fitting climax to Armistice Day observance in London. It was attended annually by some 10,000 people.

In 1946 it was decided to observe a new Remembrance Day (*q.v.*), commemorating the fallen in both wars, to be held annually on the

Sunday before Nov. 11, unless either Nov. 11 or 12 is itself a Sunday.

Armorial Bearings. The arms or coat of arms of a grantee or his family, a feudal territory, or a corporate body. *See Arms; Coat of Arms; Heraldry.*

Armorica (Celtic, land by the sea). Old name for Brittany, which was at one time inhabited by the Armorici. It was given by the Romans. *See Brittany.*

Armorican Folding. Name applied to a system of folds that affected the rocks of N.W. Europe in Permo-Carboniferous times. The axes of these folds have, in the main, an E.-and-W. direction. The result of this folding is clearly shown by the trend of the rocks in N.W. France (Armorica), S.W. England, and in S. Wales.

Armorican Grits. Subdivision of the Ordovician rocks of France, underlying the Angers Slates, and of Arenig age. Composed mainly of yellow and brownish grits and quartzites similar to those which as pebbles make up a large proportion of the Triassic conglomerate of Budleigh Salterton, Devonshire, their fossils comprise a distinctive brachiopod and trilobite fauna.

ARMOUR: DEFENSIVE AND ORNAMENTAL

Charles Houliks, Curator, Tower of London Armouries, 1913-35

This account is a purely historical description of military armour.

It is followed by one on Naval Armour, while a further article deals with Armoured Vehicles. See also under Breastplate; Cuirass;

Helmet; Shield, etc.

The development of arms and armour may be said to have passed through two distinct cycles. With possibly a third in process of evolution at the present day. The first of these, begun in prehistoric times, culminated in the equipment of the Roman legionary, and the second reached from the Christian era to the end of the 18th century. It is impossible, with any degree of certainty, to discover the materials used by the Assyrians, Egyptians, or other oriental nations before the time of the Roman empire, but it is more than probable that they were similar to those used in Europe up to the 11th century, of which period there are pictorial and written records more or less exact in their descriptions of military equipment and operations.

Quilted fabrics or leather with applied plates of metal appear to be the favoured defences of oriental nations, and these survive even to the present day in localities where western civilization has not penetrated deeply.

The want of skill of the metal worker and the inadequate supply of his material precluded the elaborate fashioning of complete panoplies of steel or bronze, although the helmet appears to have been fashioned of metal at very early periods.

The Greek equipment consisted of a short bronze cuirass, this word (from Latin *coriaceus*, leathern) showing that the early defence was of leather. The helmet, as shown on sculptured monuments, was provided with a high crest, inconvenient to the wearer, but performing the double function of terrifying the enemy and giving a rallying-point to friends. The shield was generally circular, and, according to Homer, was composed of toughened leather and brass. The legs were protected by bronze greaves, which appear to have been sprung on to the leg and not fastened by straps. The Greek wore no defence upon his arms or round his loins, but trusted to his mobile shield in this respect. The weapons used were

the short sword, the axe, the javelin, the bow, and the sling, weapons which remained in favour with but little alteration in design from prehistoric times up to the 11th century, and with certain changes of form until the 17th.

The Roman equipment was similar, but far more practical, and was frequently made of iron instead of bronze. Where the Greek cuirass had been solid, composed of a back and breast plate, the Roman defence was composed of horizontal lames or strips of metal, which allowed greater ease of movement for the body. The helmet was smaller and with little or no crest, and the legs were undefended. All these improvements were obviously due to the extended operations of the disciplined array of the Roman legions as opposed to the individual combats of the Grecian warriors. It is one of those unsolved mysteries of archaeology that, with the defensive equipment advanced to this stage and with the increased skill of the metal worker, the Romans did not progress in the invention of armour until the fighting man was covered in cap-à-pie armour such as was evolved in Europe in the 14th century.

Armour of the 11th century

The answer is probably to be found in the fact that the strength of the Roman army lay in its infantry, while the medieval heavy-armed knight relied on the shock tactics of cavalry, and the full suit of armour could only be worn by the mounted man.

On the decline of the Roman Empire the evolution of armour ceased and the warrior of Europe went back to the leather and fabric defences of the Assyrian and Egyptian periods. The skilled craftsmen of middle Europe, however, were not content to confine their efforts to jewelry and church ornaments, but produced under Saxon and later under Norman rule some useful, albeit heavy, examples of the armourer's craft. An excellent illustration of the equipment of the 11th century is to be found in the Bayeux tapestry, where the knights are shown clad in quilted defences, probably with superimposed metal plates, and conical helmets furnished with nasals or nose-guards. The long shield at this period was also cumbersome and of little practical use to the mounted man. By degrees the armourer asserted himself, and by the end of the 13th century we find definite additions of plate armour, first on the knees, then on the arms and shins, and finally, by the end of the 14th century, the knight is completely encased in plate armour hinged or

jointed at knee and elbow and his head defended by a small steel cap or by the weighty helm which completely enveloped the head.

According to some authorities the intricate fabric of mail, formed of small rings of iron interlaced, dates back to Roman times, if not earlier; certainly its use in the East was common long before the 12th century, when we find it generally used in Europe. It was, apparently, easily made, for it is shown as the ordinary military equipment of the 14th century, and it had the advantage of covering the wearer from head to foot. Its grave disadvantage was its weight

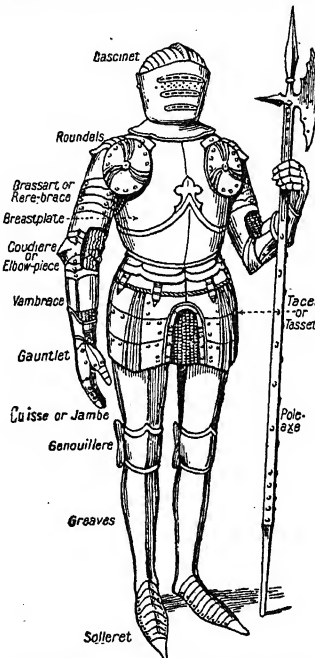
With the introduction of plate armour the science of the armourer developed as well as his craftsmanship, and he is found endeavouring to provide, not only a solid unyielding defence, but also so to dispose the plates of his material that wherever possible they present a glancing surface to the opposing weapon. A careful study of armour will show that wherever the point of lance or blow of axe or sword was likely to fall the armour was fashioned to allow the weapon to slide off and thus minimise the effect of the blow. This was quite impossible in the case of mail or fabric defences, where the full force of the blow was always felt.

The Golden Age of armour may be placed in the middle of the 15th century, and the finest representation of the equipment of this period is the effigy of Richard Beauchamp, earl of Warwick, in S. Mary's Church, Warwick. Here are seen, in addition to the plate armour of the early 14th century, small plates known as "tassets" hanging from the "taces" or skirt of plate to protect the thigh, and upstanding neckguards to deflect the thrust of a lance from the neck.

Tournament or Jousting Armour

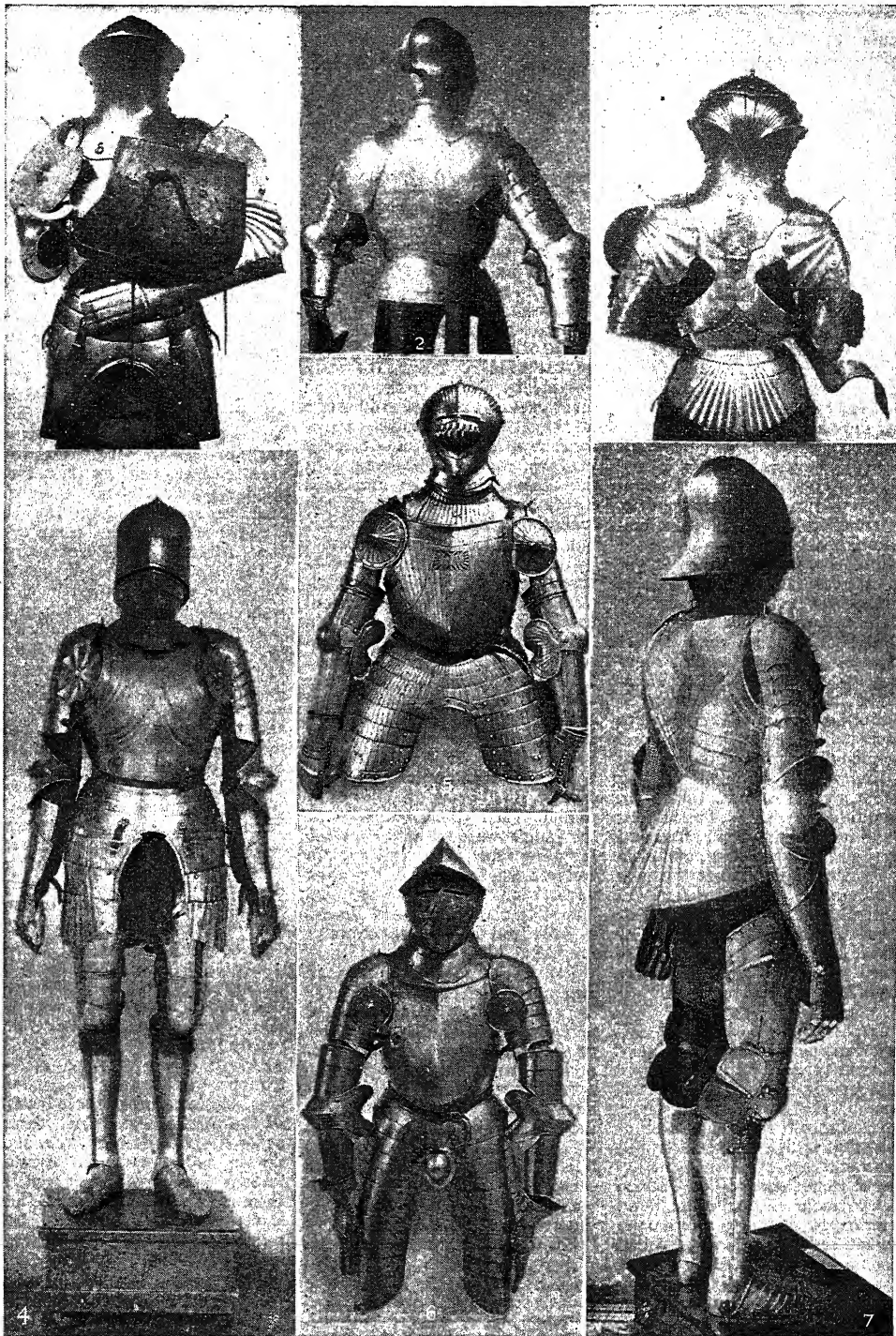
Absence of actual examples of armour of this period is explained by the fact that wrought metal was costly and fashions in armour, as in civilian dress, changed. It was therefore economical to remake armour to a new fashion, and it is thus solely due to the discarding of armour in the 16th and 17th centuries that specimens of those periods have been preserved.

In the 15th century the tournament was a firmly established sport in Europe. As civilization progressed this was practised more as a training for war and the armour was made heavier than that employed on the battlefield, where ease of movement was of equal importance with defence against attack. The principal weapon in the tournament or joust was the lance, and the jousting suit was frequently made so that the best protected position of the wearer was with his arm holding the lance in rest. The lance was invariably pointed across the horse's neck and the left was the side attacked. For this reason this side of jousting armour is heavier and thicker than the right side, and the front of the helm thicker than the top or back, where no blows would fall. Side by side with the development of the man's armour, the armour for the horse was increased until sometimes a complete suit weighed nearly 100 lb. The shield, which in the 13th century had become



Armour. Figure showing some of the names pertaining to the details of a complete suit

upon the shoulders, from which the whole fabric necessarily hung, and also the constricting of arm action by the creases formed when bending the arm. As a protection against the weapons in use it was probably adequate, but the fact that a heavy blow would drive the mail into the flesh necessitated the wearing of a thick padded under-dress which made the complete equipment heavy, hot, and inconvenient. In spite of this drawback, however, it was still retained in use with the addition of plates of metal until in the 15th century it was used only for a neck covering, for a skirt round the hips, and for gussets at the bend of arm and leg where it was difficult to employ plates.



1 and 3. Front and back views of suit of jousting armour, German, 1500-20. 2. Back of upper portion of Italian suit, c. 1490. 4 and 7. Front and back

of full suit of German make, c. 1470. 5. Fluted half armour, Maximilian style, German, c. 1540. 6. Three-quarter suit, German, c. 1540

ARMOUR: GERMAN AND ITALIAN SUITS OF THE 15TH AND 16TH CENTURIES

By courtesy of the Trustees of the Wallace Collection

smaller than the Norman pattern, became little more than a target in the 15th century, and disappeared entirely as a defence in the 16th century, except in some forms of tournament. This was but natural, for the whole body by this time had been protected and the movable defence was not needed, and, indeed, tended to hamper the wearer. Incidentally, heraldic devices on shield or surtout were a means of identifying the wearer when completely armed.

A suit of armour does not mean precisely the same as a suit of clothes, for the equipment made by the armourer to one design included not only the complete covering of the man for war, but also numerous additions and substitutions for jousting on horse and on foot. Several armours in the collection at the Tower of London take two or more figures to show the complete suit. The same collection, though small as compared with the splendid armouries of Madrid, Paris, Munich, and Vienna, possesses some notable examples of the armourer's craft, of which the simple yet well-nigh perfect armour made by Seusenhofer and presented to Henry VIII by Maximilian I ranks as the finest specimen of armour in existence. For sheer technical construction and ingenious contrivance the armour of Henry VIII made for fighting on foot, also preserved in the Tower, is a unique specimen. The armour of the foot soldier was lighter and rarely protected the legs, and even up to Elizabethan times the jack or brigandine, a body defence of small plates sewn between layers of canvas and faced with silk or velvet, was in high favour for light-armed troops, to whom mobility was of importance.

Introduction of Firearms

Up to the middle of the 16th century armour was designed to meet the same types of weapons as those employed from the earliest times, namely, the sword, lance, club, axe, and arrow, but with this difference, that by the 14th century the arrow shot from the English long-bow or from the cross-bow became a very deadly weapon, equal, if not superior, to the early and erratic musket ball. The lance also had become a more formidable weapon than the light javelin of former times. The proof or test of armour was, therefore, made with these weapons until the introduction of firearms in the 16th century. From this period up to the middle of the 17th century the contest was between the gunsmith perfecting his

weapon and the armourer providing a defence proof against the musket ball. To the end of the contest the armourer won, but in doing so he was obliged to increase the weight of his metal to such an extent that it became too cumbersome for the extended military operations of the period. Piece by piece the full suit of plate was discarded until in the wars of the Commonwealth only the cuirass and helmet remained, and by the 18th century only the ornamental gorget worn by officers.

Revivals in Modern Warfare

The First Great War led to a revival of the wearing of steel helmets by troops in the various theatres of operation, and most of the belligerent armies experimented with some form of armour partially covering the body. In the Second Great War numerous efforts were made to equip the soldier with a light body armour, but most attempts were defeated by the excessive weight and thickness of metal necessary to withstand the penetrating power of 20th century bullets. Certain troops serving in the Burma campaign were issued with so-called bullet-proof vests. These vests consisted of a light steel plating sandwiched between a fibrous material. They covered the chest, abdomen, and groin and afforded a certain measure of protection against small-arms fire, but they were too heavy and cumbersome for jungle warfare and were too fatiguing for men fighting in tropical conditions. Bullet-proof vests were also worn by U.S. troops in the invasion of France in 1944 and by bomber crews of the U.S.A.A.F.

For the study of arms and armour of the early periods the Bayeux tapestry and illuminated manuscripts are valuable guides up to the 14th century, and for later periods incised brasses and sculptured monuments, which have the advantage, in most cases, of being dated. In most armouries there are a few incomplete examples of the late 15th century, and for the 16th century the complete suit may be studied in detail in the collections in the Tower of London, the Wallace Collection, and the British Museum.

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Armour, NAVAL. To protect ships of war by armour is by no means a modern idea. In the wars of ancient Greece, rope fenders were stretched along the sides of triremes to reduce liability to damage by ramming. Roman quinquiremes had specially stout bulwarks to protect the rowers; and the Byzantines employed leather screens to ward off Greek fire. The Norsemen were accustomed to hang their shields along the sides of their long ships to keep arrows off the rowers; and in certain instances iron sheathing was used by them for a similar purpose. This latter device was also employed by the Knights of S. John in warfare with the Turks in the 16th century.

Until almost the end of the sailing ship era line-of-battle ships were habitually built with sides nearly 2 ft. thick, usually sufficient to keep out the spherical shot fired by the old smooth-bore muzzle-loaders. After Trafalgar the forecastles of British ships of the line were redesigned with rounded bows of more solid structure than had before been customary, to give protection from raking fire ahead. About the same date Congreve, of rocket fame, proposed the construction of a floating battery armoured with iron plates, but his ideas were nearly half a century ahead of his contemporaries, and so won no favour.

Earliest Iron Plating

In 1824 the possibility of plating ships with iron was discussed in France, but was dismissed on the grounds that they would no longer be safe at sea with so much weight added. Thirty years later, during the Crimean War, unarmoured ships of the British and French navies suffered severe damage from shell fire in action with the Russian forts at Sevastopol. Napoleon III thereupon ordered his naval constructors to design floating batteries capable of withstanding attack by shell.

Five floating batteries of 1,575 tons, with wooden hulls protected by 4-in. iron plating, were accordingly built in France, and five similar vessels in British yards. Three of the former, the *Dévastation*, *Lave*, and *Tonnante*, reached the Black Sea in time for the

bombardment of Kinburn on Oct. 15, 1855. H.M.S. Glatton and Meteor, British counterparts, arrived a few days too late to share in their success.

So impressed were both governments that more floating batteries were put in hand. Three ordered by the Admiralty in Dec., 1856, were of a modified design, their hulls being of iron instead of wood. All these floating batteries suffered from a common defect: they were not seagoing ships.

To build seagoing ironclads was therefore the logical sequence. First to go afloat was the French Gloire, a wooden-hulled vessel of 5,618 tons, launched in Nov., 1859. She was surpassed by the iron-hulled Warrior, of 9,000 tons, launched for the Royal Navy in Dec., 1860. In 1946 this celebrated ship still existed as a hulk at Pembroke Dock.

Subsequent progress in ironclad design was largely concerned with varying methods of distributing armour, and improved processes of manufacture. In fact, progress took the form of a continual duel between the gun-makers and the armour manufacturers. Increases in the penetrative power of the gun were met by corresponding enhancement of the resisting qualities of armour. The extreme limit of thickness was reached in H.M.S. Inflexible (launched 1876), which had 24-in. iron side armour. Thenceforward improvements were sought in the direction of toughening the face of armour plates in preference to making any addition to their depth.

It was for the gun turrets of the Inflexible that compound armour (iron with a harder facing of steel) was given its first extensive trial. This in turn was superseded within 20 years by steel armour, toughened by the Harvey method. Within a still shorter period the Krupp method of hardening the face of the armour plate came into favour; this is still in general use, with minor improvements.

At times side armour has been either confined to a small space along the waterline, leaving the ends unprotected, or distributed over an extensive area, with a corresponding diminution in thickness. During the period 1860-1890 ships' armaments were arranged on a variety of systems, e.g. on the broadside, in a central battery, in barbettes, or in turrets, with the object of affording the greatest possible protection to the weapons and their crews. In modern capital ships the guns

are mounted in turrets, and the armour belt extends from end to end, the maximum thickness being over the vital spaces amidships. Further protection is afforded internally by armoured bulkheads. As defence against plunging fire or bombing from the air, armoured decks of greater thickness than in the past are now regarded as an essential feature.

Armour plate is of two types: (a) surface-hardening, and (b) homogeneous. The steels used are the same in each, namely the nickel, nickel-chromium, and nickel - chromium - molybdenum steels. The division is based upon the heat-treatment given and the particular application. The surface-hardening type employs the steel in a condition possessing an extremely hard surface layer, as this has final resistance to the punching action of high velocity shells. The homogeneous type is manufactured by heat-treating the same steels to a homogeneous or uniform structure throughout, and the plate is then particularly suitable for resisting penetration.

Francis E. McMurtrie

Armour, GEORGE DENHOLM (1864-1949). British artist. Born in Scotland, Jan. 30, 1864, he was educated at St. Andrews. From 1880 to 1888 he studied painting at the Edinburgh School of Art and the Royal Scottish Academy, during which time he exhibited in various galleries. He subsequently went to London, where he worked as a painter and illustrator, becoming well known for his hunting jokes and drawings of horses and sporting life which regularly appeared in Punch and other periodicals. His finest work consisted of his illustrations to the books of Surtees. Armour's publications included Humour in the Sporting Field, 1928; Bridle and Brush, 1937. Died Feb. 17, 1949.

Armour, PHILIP DANFORTH (1832-1901). American merchant. He was born at Stockbridge, New York. Entering the provision business at Milwaukee, he moved to Chicago in 1870, becoming head of Armour & Co., long the world's largest firm of provision merchants. He founded and endowed the Armour Institute of Technology, Chicago, and died Jan. 6, 1901.

ARMoured VEHICLES IN WARFARE

Lieut.-Gen. Sir Giffard le Quesne Martel, K.C.B., D.S.O.

The mechanisation of armies has reintroduced the widespread use of armour on land as protection for vehicles used for the transport of men, supplies, and guns. Here is a comprehensive survey of armoured vehicles by the former commander of the Royal Armoured Corps. See also Amphibious Craft; Tank, etc.

From the earliest days there are examples of some form of armour being used on vehicles to give protection to the men and the weapons that were carried in the vehicle. With the invention of firearms, however, the weight of armour needed to give any measure of protection became so great that armoured vehicles were no longer used. At a later date the arrival of the internal combustion engine made it possible to adopt the use of armour on vehicles propelled by this means. Armoured cars appeared just before the First Great War. Even then the limited cross-country capability of wheels with solid or high-pressure pneumatic tires limited the scope of these cars in battle. Between the two Great Wars development of large low-pressure tires did much to remove this handicap and armoured vehicles played an important part in the Second Great War. The term tank applies to a machine on tracks which is armoured all round and can fight in and among the enemy (see Tank). Armoured vehicles not in

this category can best be described under various heads.

ARMoured FIGHTING VEHICLES (WHEELED). The main example in this class is the armoured car. In the early days these vehicles were generally constructed by taking a commercial car or lorry chassis and adding armour plates. Such vehicles were limited to very thin armour and only carried light weapons. Development progressed rapidly, and during the Second Great War in Europe British forces were provided with armoured cars which were specially designed and well equipped for their rôle.

Armoured cars are used mainly for long or medium distance reconnaissance. They must therefore possess high speed and a long circuit of action. Their duty is observation of the enemy, and their fighting capacity is limited to that which they need for their own protection and for breaking through a light enemy screen. The main types used by British forces were the Humber, Guy, and Daimler cars. The two former types were similar and equipped with a 15-mm

and a 7.9-mm. Besa machine-gun mounted coaxially in the turret. The Daimler cars which replaced most of the other types as the war proceeded were armed with a 2-pdr. gun and a 7.9-mm. Besa machine-gun mounted in the turret. All these cars carried armour 14 mm. thick on the vertical plates. There was little difference between these types as regards the remaining details in their specifications. They each carried a crew of three men, and the cars weighed approximately 6 tons. The circuit of action on the petrol carried was 200 miles. The Daimler had an engine developing 100 h.p. and a speed of 60 m.p.h. on roads. The other types had rather less powerful engines and slightly slower speeds. All three types had four-wheel drive and very large pneumatic tires and could travel almost anywhere across country, but they could not cross marshland or ditches. Every armoured car has a long-range wireless set for inter-communication.

The armoured cars used by the Allies and by the enemy were on much the same lines, but the Germans introduced an eight-wheeled armoured car. This vehicle had a remarkably good cross-country performance and could negotiate almost any natural obstacles except soft, marshy ground. The weapons used and the armour plate protection were similar to those on British cars.

Reconnaissance and Scout Cars

In addition to armoured cars the armies of all the nations used some form of light armoured vehicles. These were employed for scouting and for intercommunication, to take orders or liaison officers up to forward units. The two main types used by the British were the light Morris reconnaissance car and the Scout car. Both these types had four-wheel drive. The former had only 11-mm. armour protection, one Bren gun for protection, and limited cross-country capacity. It was used mainly for intercommunication, could carry four men, and was equipped with a wireless set. The Scout car had 30-mm. armour protection in front and 14-mm. on the sides. It was a small inconspicuous vehicle with exceptionally good cross-country capacity, and was used mainly for scouting. It carried a Bren gun and a Boys anti-tank rifle for protection.

SELF-PROPELLED GUNS. The armies of all nations had been concerned as to the best methods

of supporting tanks by artillery fire. When tanks advance rapidly the supporting artillery must be able to follow up over the same terrain. Moreover, the tanks can ignore small packets of enemy resistance as they advance. The artillery must therefore be supplied with some measure of armour protection to enable them to accompany the tanks or follow behind them. This gave rise to the idea of mounting artillery weapons on a tank chassis as early as 1923, when the Birch gun was introduced in the British Army. These vehicles became known as self-propelled guns.

Advent of Self-Propelled Guns

The U.S.A. produced the first type to be used by the Allies in the Second Great War. It was a 105-mm. gun howitzer mounted on the chassis of a Sherman tank, and was known as the Priest. It was used with great success in North Africa. A little later Britain produced a model with a 25-pr. field gun mounted on a Valentine tank chassis which was called the Bishop. This was also very successful in action. The Americans also used a lighter tank chassis to carry a 3-in. high-velocity gun known as the M10; the British adopted this chassis to carry the 17-pdr. anti-tank gun.

The Germans used a great variety of models of self-propelled guns. Many obsolescent types of tanks were stripped down and used for this purpose. The Russians mounted large calibre guns on the chassis of their K.V. tank to produce self-propelled guns.

CARRIERS. As soon as the tank appeared on the battlefield in 1916 a demand arose for vehicles of that nature which should carry men and their weapons into battle behind armour protection. They would then dismount and fight on foot in the ordinary way. This class of vehicle became known as a carrier. Before the end of the First Great War there were British tanks specially designed to carry a platoon of infantry behind armour protection. The chassis of the vehicle was similar to that of the existing fighting tanks, but the body was a long box surrounded with armour 12 mm. thick which would enable the infantry to be taken safely through belts of machine-gun fire up to the forward positions. The war ended before any large number of these tanks had been constructed or used.

A similar idea was used again in the Second Great War. The

Canadians constructed a tank known as the Ram which was very similar to the American Sherman tank. A considerable number of these machines were taken and fitted with a body to carry a section of infantry and their weapons. They became known as Kangaroos. They were organized in squadrons of four troops, each troop having three sections of three Kangaroos. The section carried a platoon of infantry and the troop carried a company. Hence the squadron of Kangaroos carried a battalion. These vehicles were used very successfully on several occasions in France in 1944. It had of course to be remembered that they were carriers and not tanks. The armour was only bullet proof and the men in the Kangaroo only had one machine-gun for defence while they were being carried.

Bren Carriers and their Role

By far the most successful carrier developed between the two wars was the Bren carrier. This was a small, inconspicuous, and very handy track vehicle designed by Sir John Carden in 1933. In effect it was a steel box with an open top, armoured with 10-mm. plate on the front and 7-mm. on the sides. It carried one machine-gun and a crew of three men. It used a Ford V 8 engine and could travel comfortably at 20 or 30 m.p.h. and accompany a column of motor transport. Every infantry battalion was equipped with 14 of these vehicles during the Second Great War. In mobile warfare they were used to give the riflemen the close support of machine-gun fire. In the approach the vehicles were proof against long-range small-arms fire. The crew occasionally fired the Bren gun on the move, but normally the machine was halted behind some natural cover and the gun was used from a stationary position. Bren carriers were of great value when covering a withdrawal as they could remain in position till the last moment. These machines were not small tanks and they could not be used to fight in and among the enemy. Their rôle was to carry forward the gun and the crew behind armour plate so that they could support the infantry by opening fire at close range. In defence Bren guns were sometimes dismounted and used on the ground.

The chassis of the Bren carrier was used for a number of additional purposes, and a type known as a universal carrier was designed to cover several of these rôles.



1. The Mark I Humber armoured vehicle. 2. Daimler, complete with anti-tank Besa gun. Later models were equipped with eight wheels independently sprung. 3. Morris Mark I light reconnaissance car used extensively in the Western Desert. 4. Bren gun carriers bringing up

supplies after a rapid advance in Italy. 5. Kangaroos negotiating rough ground during operations in Germany. 6. Fast scout cars manned by the Royal Armoured Corps, passing through a peaceful English village. 7. A heavy infantry tank moving across difficult country

ARMOURD VEHICLES: FAST MOBILE UNITS OF THE BRITISH ARMY

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Armoured Vehicles. Some amphibious craft used in the Second Great War. 1. Column of "buffaloes" on land. 2. Buffalo drives into the Rhine with supplies for bridgehead troops. 3. Convoy of buffaloes bring prisoners back from Beveland across the Scheldt. 4. "Terrapin" emerging from the water. 5. Loading amphibious supply craft

Photo No 4, British Official Crown copyright reserved

Being very inconspicuous it was in constant use for scouting, especially with armoured units. For this purpose it was preferable to use an anti-tank rifle instead of a Bren gun: in the universal carrier either weapon could be mounted. These vehicles were also in continual use for carrying up supplies to forward units. In another design the chassis was used to carry six men, but with less armour and ammunition.

In 1942 the U.S.A. evolved a very useful armoured vehicle with four-wheel drive and a box body made up of 8-mm. armour plate. This carried a section of infantry and their weapons or an equivalent load in stores and weapons. The Germans used vehicles similar

to Allied carriers but did not employ them in great numbers.

AMPHIBIOUS LANDING VEHICLES. Most of the great campaigns of the Second Great War started with the difficult operation of an opposed landing on beaches held by the enemy. In addition, the Allies had on many occasions to cross wide rivers with the enemy in possession of the far bank. To overcome these difficulties many special types of amphibious landing vehicles, both wheeled and tracked, were developed and used with great success. The former and the earlier models of the latter were unarmoured, but towards the end of the war amphibious armoured and tracked vehicles were in action. They were known

as L.V.T.(A.), which initials denoted landing vehicles tracked and armoured. These vehicles could travel across country and then descend a steep bank and enter a river without any pause. They floated in the water and were propelled by the tracks. On reaching the far bank they could climb out unless the bank was unduly steep. Numbers of these vehicles, both armoured and unarmoured, were used to land men and weapons on the beaches or on the far bank in river crossings. In that way they provided immediate support to the troops that had landed. These vehicles were popularly called Buffaloes. A later model was fitted with a tank turret

so that close fire support could be brought to bear on the enemy as troops were landing. None of these vehicles could be classed as tanks. They were unsuitable for fighting amongst the enemy after landing, but they proved to be of the greatest value in this supporting rôle. One of these vehicles could carry a section of infantry with their weapons, or one 6-pdr. gun, or any similar load such as a Bren carrier.

MISCELLANEOUS TYPES. Bulldozers (*q.v.*) played an important part in the Second Great War. They were used in the forefront of the battle to clear a way for tanks or transport. It became clear that armoured bulldozers would be of great value and two types were designed. One type was developed by fitting the bulldozer gear on the front of a fighting tank and the other by fitting armour plate protection on a standard bulldozer. The former were used effectively on many occasions in the forefront of the battle to remove obstacles. It was difficult, however, for the driver in the tank to see exactly what he was doing; and in addition the engine clutch in a tank was overloaded for this work. Tank bulldozers were therefore only used when essential. Ordinary bulldozers fitted with armoured plates gave full protection to the driver only from small-arm fire at long range. This protection was, however, useful on many occasions.

Armoured trains have been used in the past to a small extent but as a railway line is so easily damaged, the value in protecting the train itself with armour is limited. They are now no longer

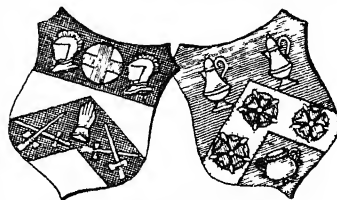
used, though Russia had a few on the eastern front in 1941.

Armourer (Fr. *armurier*). One skilled in the manufacture and care of weapons. A military armourer is a non-commissioned officer of the Royal Army Ordnance Corps who is attached to a unit of combatant troops for inspecting, repairing and maintaining in efficient order the small arms and any mechanism in their charge. The application for the attachment of an armourer to any unit is made to the officer commanding, R.A.O.C., Woolwich, and in cavalry regiments an assistant may be allotted to him; the latter receives no extra pay, but is excused regimental duties. An armourer may not be called upon to do any work requiring special instruction beyond that which he has received, and may do only such work as is laid down in the regulations.

A naval armourer is a skilled warrant officer who has charge of the rifles, cutlasses, and other small arms aboard a warship. His duties are similar to those of an armourer in the army, though he generally also acts as a blacksmith. He is provided with an assistant known as an armourer's mate. Naval armourers are distinguished by a sleeve badge consisting of crossed axe and hammer, with a horizontal cannon, an added star denoting the chief armourer.

An armourer in the Royal Air Force is trained to clean and maintain rifles, revolvers, machine-guns, cannon, and all automatic weapons, and also to synchronise gun sights. A bomb armourer is responsible for the installation, inspection, and maintenance of bombs and bomb gear other than bomb sights.

Armourers' and Brasiers' Company. City of London livery company, incorporated June 17,



Armourers' and Brasiers' Company Arms

1708. The Armourers' Company was incorporated about 1423 under the title of The Master and Wardens, Brothers and Sisters of the Fraternity of the Guild of St. George, of the men of the mystery of the Armourers of the City of London. The Brasiers appear to have been separately incorporated about 1479. The hall, in Coleman Street, E.C., was founded about 1450 and rebuilt 1840. It contains rare specimens of armour and old English plate. Make All Sure, the motto of the armourers, had reference to the proving of back and breast plates. In 1708, on incorporation of the brasiers, the additional motto, We Are One, was added. *Consult Some Account of the Armourers and Brasiers*, T. Morley, 1878.

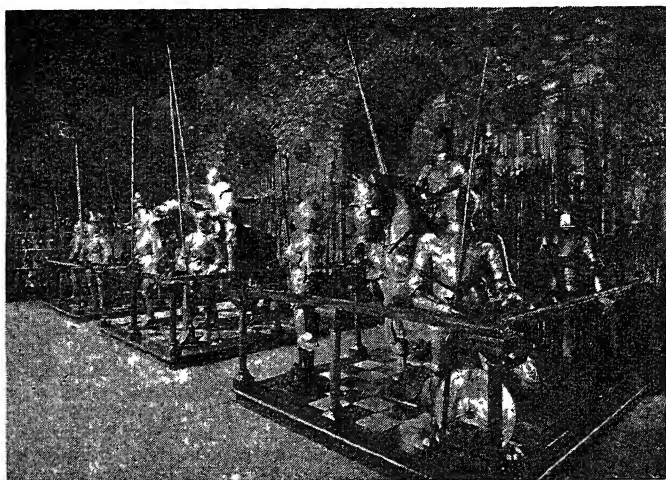
Armoury (Old Fr. *armorerie*, It. and Span. *armera*). Apartment in which weapons or instruments of war were stored until required for service, repairs undertaken, or (modern) arms manufactured; also the contents of such a store-room.

In the Middle Ages every castle had its armoury. In England the laws enforced by Henry VII against livery and maintenance put an end to private armies. But in countries where the central government was weak, the feudal system survived, and many castles in central Europe have retained their historic armouries until modern times. That at Churburg in South Tyrol is the finest and most complete example of a castle armoury remaining in Europe, having descended in one family (Trapp) since the 14th century. The armoury at Wilton House (seat of Lord Pembroke), dating from the 16th century, survived in England until dispersed by sale in 1921 and 1923.

The arsenal at Graz in Styria is not a princely armoury, but a military arsenal or mobilisation store of the late 16th century, and one of the most complete and instructive of its kind. Before the establishment of a standing



Armoured Vehicles. Bulldozer surmounting the ruins in a French town during the Allied advance towards Orne 1944. It is armoured against possible snipers



Armoury. Portion of the armoury in the Tower of London. The first mounted figure displays the 16th century armour of the Earl of Leicester

army in England in 1660, armour for the national levy or militia was provided and kept at the common charge, and often stored for convenience in the parish churches. Some of this "town armour," can still be seen in the church of Mendlesham, Suffolk.

Arms. Military term, meaning (1) weapons of all kinds, exclusive of ammunition; (2) different kinds of fighting troops, e.g. infantry, cavalry, artillery, engineers. Duties connected with guards, etc., are described as duties under arms; bayonets and swords are termed side arms in English and *les armes blanches* in French.

The enormous variety of weapons extant in museums may be classified as firearms, cutting and thrusting weapons, and missiles. *See* Armour; Artillery; Rifle; Sword, etc.

Arms. Heraldic term, signifying the armorial bearings of those individuals or bodies entitled to display or "bear" them. They consist of shield with charges or devices, surmounted where requisite by helm and crest with mantling, flanked by supporters, and supplemented by a motto. Arms in the U.K. are granted by the College of Arms (*q.v.*). *See* Badge; Coat of Arms; Crest; Heraldry; Shield.

Arms and the Man. Burlesque romantic drama by Bernard Shaw. It was produced April 21, 1894, at the Avenue Theatre, London (*q.v.*). The period is immediately following the first Serbo-Bulgarian war, 1884, and the play derides the glorification of soldiering and war in the person of a Swiss mercenary who disliked both. The title was taken from the first line

of Virgil's *Aeneid* in Dryden's translation: *arma virumque cano*, arms and the man I sing. A notable revival was that of the Vic-Wells company at the New Theatre, London, 1944, with Ralph Richardson and Laurence Olivier in the leading parts. The *Chocolate Soldier (q.v.)* is a comic opera founded upon the play.

Armstrong, WILLIAM GEORGE ARMSTRONG, 1st BARON (1810-1900). British engineer and inventor. Born at Newcastle-on-Tyne, Nov. 26, 1810, Armstrong became a solicitor, but his real interests were scientific, and before 1841 he had published papers on engineering subjects. In 1846 he took out his first patent, and in 1847 established works at Elswick, near Newcastle, for the manufacture of hydraulic machinery.

During the Crimean war he turned his inventive genius to the making of guns. His own creation, the Armstrong gun, was taken up by the British government, and works were opened at Elswick under his management for the making of ordnance. Although in 1863 the government adopted a simpler style of gun, Armstrong continued to make improved versions of his own breech-loading type and its am-

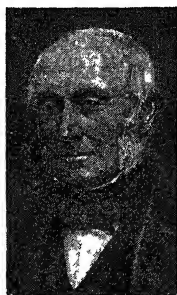
munition, and in 1880 it was once more taken up by the government. In 1882 the Elswick works, amalgamated with the shipbuilding firm of Mitchell & Swan, was registered as a limited company and began to build warships. In 1897 it took over the Manchester engineering firm of Joseph Whitworth & Co. Under the name of Sir W. G. Armstrong Whitworth & Co., Ltd., the firm has since become famous as an engineering firm of wide interests, including steel works, engine works, shipbuilding, and the making of ordnance and aircraft.

Another of Armstrong's interests was the conservation of Britain's coal supply. He also spent much time upon research into the possibilities of electricity. In 1859 he was knighted, and in 1887 was made a peer. He died Dec. 27, 1900, at Cragside, Rothbury. His title became extinct, but his heir, his great-nephew W. H. A. F. Watson-Armstrong, was made Baron Armstrong in 1903, and was succeeded by his son (b. 1892) in 1941.

Armstrong, ANTHONY (b. 1897). Pen name of Anthony Armstrong Willis, British humorist and playwright. Born at Esquimaux, British Columbia, Jan. 2, 1897, he was educated at Uppingham and Trinity College, Cambridge. In 1924 he began to write for Punch, and in 1925, retiring from service with the Royal Engineers, became a regular contributor until 1933 over the initials A. A. In the Second Great War he joined the R.A.F.V.R., and founded Tee Emm, the R.A.F. Training Memorandum. He published various collections of humorous writings, from *Warriors at Ease* to *Prangmen Mess* and *Prune's Progress*, several humorous novels, and many thrillers. His most successful plays were *Full House*, 1930; *Orders* (with Ian Hay), 1932; and *Ten Minute Alibi*, 1933.

Armstrong, ARCHIBALD (d. 1672). Scottish jester at the courts of James I and Charles I. He was discharged from the king's service in 1637 for taunting Archbishop Laud with the hostile reception given to his liturgy at Stirling. He is chiefly remembered for his *Banquet of Jest*s and *Merry Tales*, 1630, repr. 1889.

Armstrong, MARTIN DONISTHORPE (b. 1882). English poet and novelist. Born at Newcastle-on-Tyne, he was educated at Charterhouse School and Pem-



Baron Armstrong,
British engineer
Royal Institution of
Civil Engineers

broke College, Cambridge. He produced several volumes of poems, collected in 1931, but it was as a novelist, and pre-eminently as a writer of short stories, that he made his reputation. His best-known books are *The Goat and Compasses*, 1925; *Saint Christopher's Day*, 1928; *Adrian Glynde*, 1930; *Lover's Leap*, 1932; *The Snake in the Grass*, 1938; *Simplicity Jones*, 1940; and *The Butterfly*, 1941. He edited a popular anthology, *The Major Pleasures of Life*, in 1934.

Armstrong, WILLIAM (b. 1882). British actor and producer. Born at Edinburgh, Nov. 30, 1882, he was educated at Edinburgh university and studied for the musical profession. He made his first appearance on the stage at the Stratford Memorial Theatre in 1908, and was stage manager for the Glasgow Repertory Theatre, 1910-12. Appointed producer to the Liverpool Repertory Theatre (*q.v.*) in 1922, he was made a director the following year, and under his administration the theatre became one of the most progressive theatrical ventures in the country. In 1945 he became associated with Sir Barry Jackson (*q.v.*).

Armstrong College. Educational establishment at Newcastle-on-Tyne, founded 1871, and since 1909 part of King's College in Durham University (*q.v.*).

Army. Word applied generally to a body of men fighting on land in some region or under a particular leader, *e.g.* Crimean Army, Wellington's Army. Technically an army is a formation composed of corps or divisions under an army commander. There are generally 3 or 4 corps in an army and a corps usually contains 3 or 4 divisions. The division is the smallest formation which normally exists composed of all arms, and is commanded by a general. With large forces armies are organized in army groups which come under the supreme commander. Air forces, except for the naval arm, normally form part of an army, as the effect of their work is on the ground, but in the British Empire the air forces form a separate service.

From the earliest days armies have consisted of two types of troops. There have been the mobile troops whose duty it was to push ahead, gain contact with the enemy, find his flanks, attack him whenever he was found to be weak, and carry out a pursuit. The other body has been the

slower moving, harder hitting troops whose duty it was to close with the enemy and hold or attack strong defences when necessary. In the days of Jenghiz Khan armies consisted mainly of mobile troops; his own army was almost entirely cavalry. On the other hand, in the First Great War, cavalry were useless in the face of modern machine-gun fire, and armies consisted mainly of infantry and the supporting arms used for the attack and defence of strong positions.

Today the mobile troops consist of armoured divisions equipped with fast tanks and of airborne troops and paratroops. The infantry for the heavier fighting are supported by slower but more heavily armoured tanks and artillery. Both these types of troops are equally important in modern war, and they both require full support from the air.

The value of an army depends on three main factors: the nature of the personnel, the state of the equipment, and the efficiency of the training. Without good personnel an army can achieve nothing. The men must be loyal, determined, brave, and tough. In addition to these qualities and their technical training, it is important that the men shall have officers under whom they will be proud to serve. Next in importance is the equipment, for without a proper supply of munitions the bravest men can achieve very little. The training depends on these first two factors. Without good men and suitable equipment for training, a high technique in war cannot be reached. An amateur army usually has a low technique and little chance against a highly trained professional army.

Continental Conscript Armies

Countries like France, Germany, and Russia have always maintained large conscript armies. The men have had to pass through a period of military training of a few years' duration, and have then been available to be called up when required on mobilisation. With such large numbers none of these nations was able to modernise the whole army before the Second Great War, owing to expense and lack of equipment. Large bodies of cavalry were retained in addition to the armoured forces in the mobile troops. Then the modern form of infantry division has motorised transport for the equipment and stores and has lorry or bus companies to transport the

men when necessary. In this way such a division can carry out a strategical approach march of 200 miles without difficulty. But again, owing to the cost and the short time available, only a limited number of the divisions of any of these armies had been modernised in this way. The remainder still had horse-drawn transport and the men marched on their feet. As a result the nature (and the efficiency) of the armies differed materially on the various fronts in the Second Great War.

In the early stages the Germans used a limited number of armoured divisions supported by motorised infantry divisions to overrun Poland and then France. In North Africa neither side could maintain armies greater than a few infantry divisions and four or five armoured divisions at the front, owing to the difficulty of supplying them with petrol and water across the desert. Both British and Germans therefore used very highly trained divisions fully supplied with every form of modern equipment.

German and Russian Armies

On the Russian front the Germans attacked initially with a highly equipped army of a moderate size. The Russian army was always a long way behind the other armies in technique and was quite unable to stand up to this highly trained modern army. As the Germans advanced the distances became greater, and the Germans had to use large numbers of divisions with horse-drawn transport. Against that reduced scale of modern equipment and technique the Russians were able, with their greatly superior numbers, to turn the tide and win the war on their front. In France and Germany on the western front the overwhelming air support which the British and U.S. armies received was a decisive factor in achieving final victory.

With the arrival of the atomic bomb, it is possible that the main work of armies may lie in police duties. The atomic bomb can hardly be used to enforce peace among frontier tribes, nor can it be used when the forces are in close contact. It seems likely that armies of the present type though of a limited size will be required for many duties. It is also possible that a counter may be found to the use of atomic bombs; a means of countering new weapons has usually been found in the past.

Lt.-Gen Sir G le Q Martel

THE BRITISH ARMY: HOW IT HAS GROWN

HON. SIR JOHN FORTESCUE, K.C.V.O., Author of *A History of the British Army*

This article by a writer who made the recording of the British Army's story his life's work reviews that story from Saxon times to the end of the 19th century. Another authority brings the account up to date in an article immediately following. See also the articles on the various corps and regiments under their own headings and under Artillery; Cavalry; Infantry; Strategy; Tactics; War, etc.

The military force of England in Saxon times was the nation in arms, military service being obligatory upon all free landowners between the ages of sixteen and sixty. Knight-service, introduced from the Continent by William the Conqueror, never took firm root in England: and the policy of the earlier kings was to foster the national militia, and to accept a pecuniary composition in lieu of the personal service of the feudal force. With the money thus gained contracts were made with men of position for the provision of a certain number of soldiers for a certain time, and thus came into being the professional soldier. Men regarded war as a profitable concern, involving risks indeed, but promising also large rewards from ransom or plunder. Hence they invested money in a military company as they might in a private man-of-war, holding command in it according to the amount of their venture. Such was the origin of the system of purchasing commissions which survived in England until 1870.

Broadly speaking, in the English medieval army, the wealthier class—the feudal force—supplied the cavalry, and the men of the national militia the infantry. But the English had taught their conquerors their ancient custom of always dismounting for battle, their lances being shortened to a convenient length for shock-action, while the militiamen, armed with the long bow, supplied missile action. By the combination of these two elements the victories of Crécy, Poitiers, and Agincourt were won, and the great traditions of English military prowess were established.

New Model of 1645

By the end of the 15th century civil strife and the introduction of fire-arms had weakened the organization of the national militia. Hitherto every man had been required to bring his own weapons to muster; but fire-arms were beyond the means of ordinary men, and the tendency was to shift the burden of providing weapons from the individual to the state. A feeble attempt was made under Philip and Mary to adapt the old militia statutes to the needs of the time.

Throughout the perilous years of Elizabeth the national force remained defective in both organization and armament. Englishmen

who had served with the most highly trained armies on the Continent diffused their knowledge at home by writing books, but could do little to further national military reform. Finally, in the first years of James I, a new Militia Act practically destroyed the old national force, though without impairing the obligation of all citizens to military service.

The Civil War showed that the entire military system of England was chaotic, and in 1645 the Parliament found a way out of its difficulties by creating the New Model professional army of about 24,000 men. The soldiers were to a great extent impressed men, but, being trained by English veterans from the schools of Holland and Sweden, soon became efficient. This army conquered the three kingdoms, and when supplemented later by a military constabulary, became under Oliver Cromwell the terror of Europe.

Nucleus of the Standing Army

With the Restoration the constabulary was swept away, and most of the New Model was disbanded. One regiment of foot, however, was saved, and a regiment of horse was formed by enlisting discharged troopers. These, together with a regiment of foot-guards and two troops of horse-guards, levied from among the king's adherents, made the nucleus of the present standing army. The militia was also reconstituted by a statute of 1663. It was to be provided and maintained, according to certain proportions fixed by the Act, by the owners of property in each county; but the numbers, being dependent on the wealth of the inhabitants, were never defined, and, owing to various defects, this militia soon ceased to be of the slightest military value. The sole and supreme command and government of both army and militia was vested in the sovereign.

The administration of the army was carried on for the next 150 years somewhat as follows. The sovereign, or the commander-in-chief, issued his orders through his Secretary at War, an official who, though at first a personal secretary, became under the house of Brunswick responsible to Parliament for the finance of the army. This functionary's office was called the War Office, and until the close of the 18th century never employed more than twenty clerks.

The army, for financial purposes, was divided into "guards and garrisons" and "regiments." Guards and garrisons signified the governors of certain fortresses, mostly on the coast, and the minute garrisons which, according to ancient practice, were inalienably attached thereto. Each regiment was the property of its colonel and a self-contained and independent unit. Every item of a regiment's cost, excepting the musket, bayonet, and a part of the equipment, which were provided by the Office of Ordnance, was defrayed from the regimental pay-list as the pay of real or fictitious men. The clothing was supplied by the colonel, who was authorised to stop 2d. a day from the pay of every man for the purpose, and to make a profit out of the transaction if he could. The balance of the soldier's pay, after deduction of other stoppages, was devoted to his subsistence. The colour and facings of the clothing were fixed by regulation, but in all other matters the colonel might follow his own fancy. He was equally at liberty, until 1784 or even later, to drill and train his men as he pleased. The regiment was everything, and within the regiment the colonel, saving the proprietary interest of his officers, was everything. The agent, the paymaster, the doctor, and the chaplain all began life as the colonel's servants. The agent was his accountant, and the agents, by doing all the accountants' work of the army, saved the War Office from the expense of keeping many clerks.

Colonels and Recruiting

Recruiting was entirely a regimental matter. The War Office fixed from time to time the amount of the levy-money, which included the bounty to be offered to recruits, but in time of peace went no farther. A soldier was supposed to be enlisted for life, and was generally kept in the ranks as long as he could stand, in order to save his captain's pocket. In time, however, the term of a man's "life" was accepted to be twenty-one years, after which he was eligible for a pension at Chelsea Hospital: and twenty-one years became the regular period under the conditions of long service. But there was nothing to prevent a colonel from enlisting men for a limited period, if he thought fit, though he did so at his own risk; and the 17th

Light Dragoons were actually raised upon these conditions in 1759. No particular recruiting districts were assigned to regiments until 1782, and recruits were gathered in the region of the regiment's quarters for the time being. Barracks were early introduced into Ireland, but, except at the Tower of London and one or two fortresses, there were no barracks in England until 1793, and the men were quartered in public-houses at a rate of payment fixed by the annual Mutiny Act.

Strength of the Early Regiments

The difficulty of collecting men together under such conditions was a serious bar to discipline, but in any case the enormous powers enjoyed by the colonel left a regiment very much at his mercy. No general had any great control over him, for he was proprietor as well as commander. Indeed, the colonel was commonly a general himself, for, until 1814, no general officer drew any pay as such, and unless a general were on the staff, or governor of a fortress, or colonel of a regiment, he received only the pay of his regimental rank and frequently did regimental duty. Very few regiments had more than one battalion, and very few battalions had, in time of peace, more than eight companies of from sixty to eighty men apiece, so that the proportion of independent proprietary commanders to the number of soldiers was excessive. Thus the initial difficulties of converting a mere assembly of battalions into an efficient army in the field were gigantic; but, on the other hand, the intensity of regimental feeling and regimental pride carried the British soldier triumphant through many perils.

Owing to the system of including every item of expenditure on the cavalry and infantry under the heading of regimental pay, the estimates submitted to Parliament by the War Office were very simple.

Parliament and the Army

The artillery and engineers were subject to the Board of Ordnance, which accordingly presented the estimates for their maintenance together with those for material of war. The artillery (first regimented in 1716) and the engineers were exempt from the purchase system and were clothed by the Board of Ordnance. The estimates drawn up by the War Office were known as the establishment; but until 1707 there were separate establishments for England and Scotland, and when these were merged into the British, there still remained until 1800 an independent establishment for Ireland. Each of the three kingdoms had its own commander-in-chief, War Office, and

Board of Ordnance; but the number of troops in Ireland was fixed by an Act of William and Mary, instead of fluctuating as in Great Britain. On the other hand, it was the custom to keep in Ireland a great many regiments at a very low strength; and, as provisions were cheaper, the rates of pay there were also lower. Hence the shifting of troops backward and forward across St. George's Channel caused much administrative and financial derangement.

Having once voted the military estimates, Parliament for many generations took little further interest in the expenditure of the money or the efficiency of the army. Indeed, but for the mutiny of the Royal Scots in 1689, which brought about the annual Act to prevent mutiny and desertion, there might never have been any legalised system of discipline at all. Both political parties loathed the very name of a standing army, and did their utmost to discourage it. The civil population also hated the red-coats, who represented the only efficient police in the country.

Unpopularity of Foreign Service

The discipline of the army, too, was severe, and sometimes arbitrary, hence the service was dishonoured and unpopular. Yet the army grew with the growth of the Empire, for new possessions involved new garrisons. These were abhorred by Parliament because they meant increased expenditure. Members were impatient of places where barracks must be built and provisions must be stored, because there were no public-houses where soldiers could be quartered and fed as at home. The troops, likewise, loathed foreign service; and, owing to the difficulty of relieving foreign garrisons, regiments were kept for twenty, thirty, and even sixty years unrelieved in foreign stations. In India the East India Company could only maintain its European regiments by enlistment for short periods, and was obliged to call in the help of the regular army as early as 1754.

Until 1794, when Pitt created a Secretary of State for War, the direction of a campaign fell to that one of the two secretaries of state within whose geographical district the scene of operations might lie; or, if the theatre of hostilities was wide enough to enter the district of both, then the war was conducted concurrently by both. The army being always weak and never ready, the first step was to increase its establishment by augmenting the bounty to recruits and by offering commissions to individuals to raise

new regiments. As this took time, and troops were needed at once, especially to man the fleet, the men of two or three battalions were commonly drafted into one, and the officers of the depleted corps were dispersed to raise the regiment anew. The troops generally took the field at first in want of everything necessary for an active campaign. In any case, horses and drivers for the artillery had to be hired, as well as wagons and horses for transport. All matters of transport and supply, being arranged by contracts, were under the control of a commissary from the Treasury, who might understand finance but knew nothing about transport. A general, therefore, had to improvise everything for the field and the initial waste and extravagance were appalling.

Maintenance of the Field Army

The difficulty of all difficulties, however, was to keep the ranks of the field army full. In Marlborough's time armies fought only in the summer, and sent their officers home in the winter to raise recruits for the next campaign. Even so it was a struggle to make good the casualties; and, when campaigns began to continue from year's end to year's end, the problem became more pressing. It was a favourite but unsatisfactory device of the 18th century to impress unemployed and masterless men; but in Queen Anne's time the need for men was so urgent that soldiers were enlisted for short terms. Unfortunately, the war outlasted the periods of service and the men claimed their discharge, so that matters were worse than ever.

Revival of the Old Militia

The elder Pitt fell back on the idea of raising men for rank—that is to say, of offering a commission and half pay to anyone who would bring in a given number of recruits—so many for an ensigncy, so many for a captaincy, and the like. Thus a great many new battalions were raised and drafted into the old regiments; but the system produced bad men and was in other ways most vicious and wasteful. On the other hand, Pitt in 1757 gave new life to the old militia. An Act was passed to train the entire male population of England to arms by passing a certain quota of each county, chosen by ballot, through the ranks of the militia every three years. The Act was not enforced until twenty years later, and was vitiated by allowing balloted men to provide substitutes.

During the American War the ballot was enforced, but the demand for substitutes gathered into the militia the recruits that should



Army. The evolution of uniform in the British Army from 1558 to 1802. Left to right—Mounted: Cromwellian Trooper, 1648; Dragoon, 1751; Light Dragoon, 1792. Foot: Infantry, 1558; Royalist and Parliamentarian, 1649; Musketeer, 1685; Infantry of the Line, 1742, 1792, and 1802

Specially drawn by Charles M. Sheldon from sketches by R. Simkin

have joined the army. Patriotic cities and individuals raised new regiments at their own expense, but the question was not how to raise regiments but how to keep their ranks filled in the field.

Work of Frederick, Duke of York

When the war of the French Revolution broke out in 1793 the younger Pitt failed conspicuously in grappling with the problem. He did create a militia in both Scotland and Ireland, where hitherto there had been none; but he did not prohibit substitution. Moreover, he permitted the men who should have served in the militia to evade service by becoming volunteers, and by raising men for rank and other unsound expedients reduced the whole army to chaos. In 1799 he was driven to bribe militiamen to enlist in the regulars. At last, after much confusion, Castlereagh, in 1806, restored order. He turned the militia into a recruiting depot for the army, maintaining the ballot though permitting substitution, but converted the volunteers into a local militia for home defence, equally recruited by ballot, but with substitution forbidden. By these shifts, which were on the point of breaking down when peace was concluded, the war was carried to a successful issue. All the efforts of Pitt and Castlereagh would have been vain, however, but for the work of

Frederick, duke of York, the commander-in-chief. Taking over the army in a hopeless state in 1795, the duke first reorganized the staff at headquarters and restored discipline. Later he added a second battalion to almost every regiment in the line, and laid down the principle that for every battalion abroad there should be one to feed it at home. He also put the medical service and chaplains' department into order, and founded the Staff College, the Royal Military Academy, and the Duke of York's School. No single man has ever done so much for the army as the duke, nor received so little credit for it.

Blunders of the Crimean Period

After Waterloo Parliament returned to its old railing against a standing army and allowed all the military forces to fall into decay. The army was reduced to a shadow, and the ballot for the militia was suspended year after year. In 1829, however, Parliament passed an Act to establish a national constabulary, being too inept to grasp that this also was a standing army; and thus the troops were relieved from police duty at home. The Crimean War saw all the old blunders of the 18th century repeated, and the nation began to think about reform of the army. As a beginning, the artillery and engineers were transferred from the command of the Board of Ordnance

to that of the commander-in-chief. A menace from France was, however, met by the old discredited expedient of raising masses of volunteers. In 1858 the Crown took over the sovereignty of India, and with it the control of all the East India Company's troops, both native and European.

Lord Cardwell's Reforms

In 1870, the year of the German triumph, Lord Cardwell introduced real reforms. The purchase system was abolished; the term of service for privates was reduced from twenty-one years to seven with the colours and five with the reserve; an additional battalion was given to the first twenty-five regiments of the line; and the remaining battalions were linked together in pairs to prepare them for fusion into single regiments. In 1881 this fusion was accomplished: the old numbers were swept away and territorial titles substituted for them.

All of this was good work. But the militia and volunteers still remained to be dealt with, and, except that a step forward was taken by affiliating them to the territorial regiments, no one seemed able or courageous enough to undertake the task. On the other hand, after two centuries of struggle, the control of transport and supply was wrested from the Treasury and handed over on a military basis to the newly created Army Service Corps.

THE MODERN BRITISH ARMY

Lt.-Gen. Sir Giffard Le Quesne Martel, K.C.B., D.S.O.

Here the story of the growth of the British Army is continued to include the period of the First and Second Great Wars. See Badges plate, and also under Airborne Forces; Artillery, Auxiliary Territorial Service, Commission; Infantry; Rank; Tank; Territorial Army; War Office, etc., and under the names of individual regiments and army services

It has been seen that the Cardwell reforms of 1870 concentrated mainly on establishing a system whereby our garrisons overseas were kept efficient and up to strength. Little was done to solve the problem of home defence or the provision of an expeditionary force. In 1906 R. B. (later Lord) Haldane took the military forces in hand. He started by creating an Imperial General Staff which should coordinate the military forces of the Empire. In the British army the regular troops continued under the Cardwell system with equal numbers of battalions at home and abroad. Lord Haldane, however, converted the Volunteers and the Militia into a new Territorial Force and a Special Reserve.

The regular army at home was responsible for producing an expeditionary force for warfare in any theatre of war. In addition it had to find drafts to maintain overseas garrisons at full strength. On mobilisation the regular army

at home was to be brought up to strength by reservists. Wastage during a campaign was to be made good from reserves, particularly from the Special Reserve.

The Territorial Force, formed from the Volunteers and the Yeomanry, was responsible for the defence of the home country, thereby freeing the regular army at home for service in any theatre. It is important to realize that the men of the Territorial Force were enlisted for home service only and were unpaid except when undergoing training in camp each year, a training that usually lasted 14 days. Enlistment for both Regular and Territorial bodies was on a voluntary basis.

Strength of the Army

Before the First Great War the position was reached that the expeditionary force formed from the regular army at home was composed of six divisions and one cavalry division. Each division consisted of three infantry brigades, each of four battalions; three

field artillery brigades, each of three batteries; one brigade of howitzer batteries; and one heavy battery. In addition there were two field companies of engineers, the divisional signals, the medical units, and the administrative troops. The cavalry division had four brigades each of three regiments of cavalry, two brigades of Royal Horse Artillery, and one field squadron of engineers. Preparations were also made to send out additional troops with the expeditionary force for the lines of communication and administrative services.

The Territorial Force was organized in 14 divisions, on the same establishment as the regular army except that they had four gun batteries instead of six. They also had 14 mixed mounted brigades.

The strength of the regular army, including those serving in India, was 255,000; behind them were 146,000 reservists who had served in the ranks, and a special reserve of 63,000. The normal term of service for regular soldiers was seven years with the colours and five in the reserve. The effective strength of the Territorial Force was 250,000.

During this period the soldier was paid 1s. 1d. a day, but this could be increased by proficiency pay, etc. The total cost of the



Army. Development of British Army uniform during the 19th and 20th centuries. Left to right—Mounted: Hussar, 1832; Lancer, 1890; Cavalry Trooper, 1914. Foot: Representatives of the Infantry of 1812, 1836, 1854, 1864, and 1890; service dress, 1914, and trench kit, 1917. See also p. 637

Specially drawn by Charles M. Sheldon from sketches by R. Simkin

whole army, including the Territorial force, in 1910-11 was £27,760,000.

Shortly after the South African war the post of commander-in-chief was abolished, and an Army Council was instituted. The country was divided into seven commands: Aldershot, Southern, Eastern, Northern, Scottish, Western, and Ireland. Of the expeditionary force, two divisions were located at Aldershot, two in Ireland, one in Southern Command on Salisbury Plain, and one in the Eastern Command.

The Imperial General Staff made considerable progress at this time in obtaining the agreement of the Dominions to use to a large extent the same organization and equipment as the British forces. This was an important step.

In view of the tension that was arising at that time in Europe and of British commitments due to the *entente* with France, this great work carried out by Haldane was of the highest national importance and urgency. There were naturally certain faults in the organization; but when the crisis arrived in 1914 the expeditionary force was mobilised without a hitch. The Territorial Force was also mobilised with great ease, and volunteered for service in any theatre of war.

The First Great War

The British Expeditionary Force sent to France in Aug., 1914, consisted of five divisions and one cavalry division, and numbered nearly 100,000 men. A sixth division joined them in Sept. Other infantry divisions were made up by bringing home troops from abroad and by other means. By the spring of 1915 there were eleven divisions of regular troops in the field. The first six and the 7th, 8th, 27th, and 28th were on the western front, the 29th was in Gallipoli.

Meanwhile the Territorial divisions had been hard at work training and preparing for war. A great deal of weeding out of unfit men had to be carried out, but large numbers of volunteers were pouring in each day to enlist. No plans had been made for a great expansion of the Territorials, and the organization could not cope with these vast numbers of recruits. Plans for filling up wastage in the field were inadequate. The special reserve was far too small to fill the needs of the regular divisions, and practically no reserve existed for the Territorials.

Lord Kitchener, now secretary of state for War, at once called

for 100,000 volunteers for the infantry as a start, and formed them into service battalions. These were attached to the various regiments and numbered consecutively after the Territorial battalions. Some regiments such as the Northumberland Fusiliers, had as many as 25 service battalions. These were known as the New Army or Kitchener's Army.

At the earliest possible moment they were made into divisions with the other arms. The New Army arose from a wonderful response by the nation's manhood to Lord Kitchener's demand for volunteers. The New Army divisions were numbered from 9 to 26. At a later date additional New Army divisions were numbered from 30 to 41. The 14 Territorial divisions were numbered 42 to 44 and 46 to 56; a new 2nd Wessex division being raised and numbered 45. The first of the Territorial divisions began to move to the front in the spring of 1915, and the first of the New Army divisions in the summer.

The great expansion called for a new higher organization. The divisions that went to France in the first expeditionary force were grouped into corps of two divisions each. At a later date a third division was added to each corps. Later still the corps were grouped into armies, and eventually there were five armies in France.

Conscription

So far the Army had been enlisted entirely from volunteers, and there was reluctance to introduce compulsory service. By the autumn of 1915, however, it became clear that in spite of the early success the voluntary system was not producing the necessary number of men. The government decided to give the system a last trial. Lord Derby introduced what was known as the Derby scheme. Men were invited to "attest" at once and to be called up at later dates in groups according to age, the unmarried men being expected to volunteer first. In June, 1916, it came to light that out of just over 2,000,000 available single men only half had volunteered. Over 1,500,000 married men had come forward, but many of these men were in "starred" occupations and could not be released, and many others were unfit. The voluntary system had in fact failed. On Jan. 24, 1916, the first Compulsory Service Act was passed. All single men between the ages of 18 and 41 were brought in as from March 2

of that year. This was followed by a similar measure for married men. In this way a satisfactory flow of recruits was provided until March, 1918, when very heavy casualties were incurred and a further Act was passed calling in men up to the age of 51.

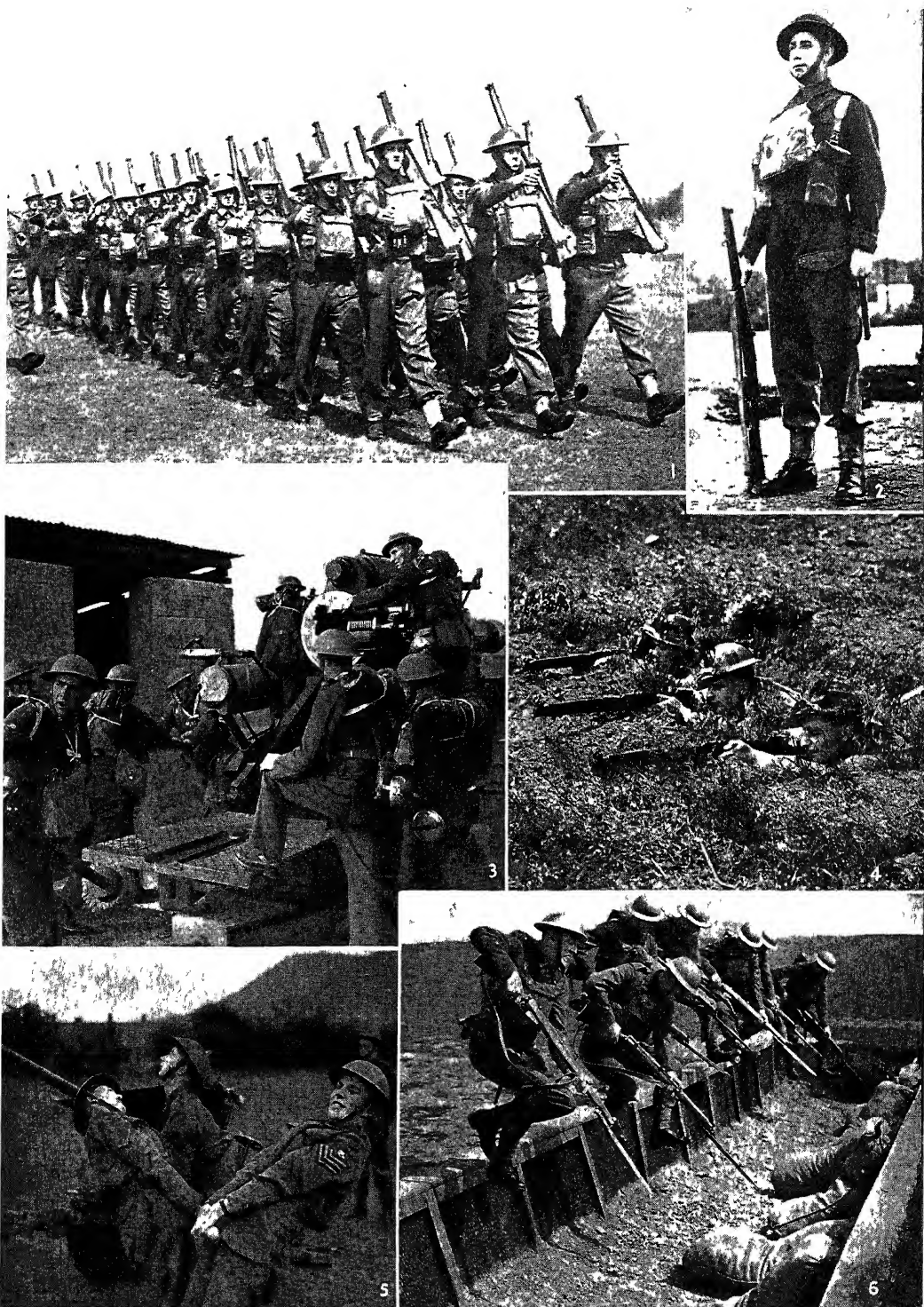
As a result of these measures, it was found possible to maintain over 70 divisions in the field during 1917 and 1918. There was an even greater expansion in the artillery, which rose to a strength of just over 500,000 in all ranks. The 486 pieces of artillery which had been taken to France in 1914 had become 6,437 guns and howitzers by 1918. The number of those serving in the ranks of the British army during the First Great War (excluding Imperial troops) was 5,704,416. Imperial troops from overseas brought the total to 8,654,567.

The Women's Army Auxiliary Corps, later Queen Mary's Army Auxiliary Corps, began as the Women's Legion in 1915, and was intended as a corps of paid women to replace men owing to the shortage of man-power. Before the end of the war the "Waacs" had reached a strength of 56,000.

New Methods in Land Warfare

No great progress or changes in weapons had taken place in the British army between the South African and the First Great War. But an important innovation was the establishment of the Royal Flying Corps in 1912. This was an army establishment, the Royal Naval Air Service being formed to cooperate with the Navy. Aircraft were limited to reconnaissance in the early days of the war, and in fact this was their main function throughout the war. This work was of great value, but it became clear before the war had ended that in future warfare air forces would play an increasingly active part.

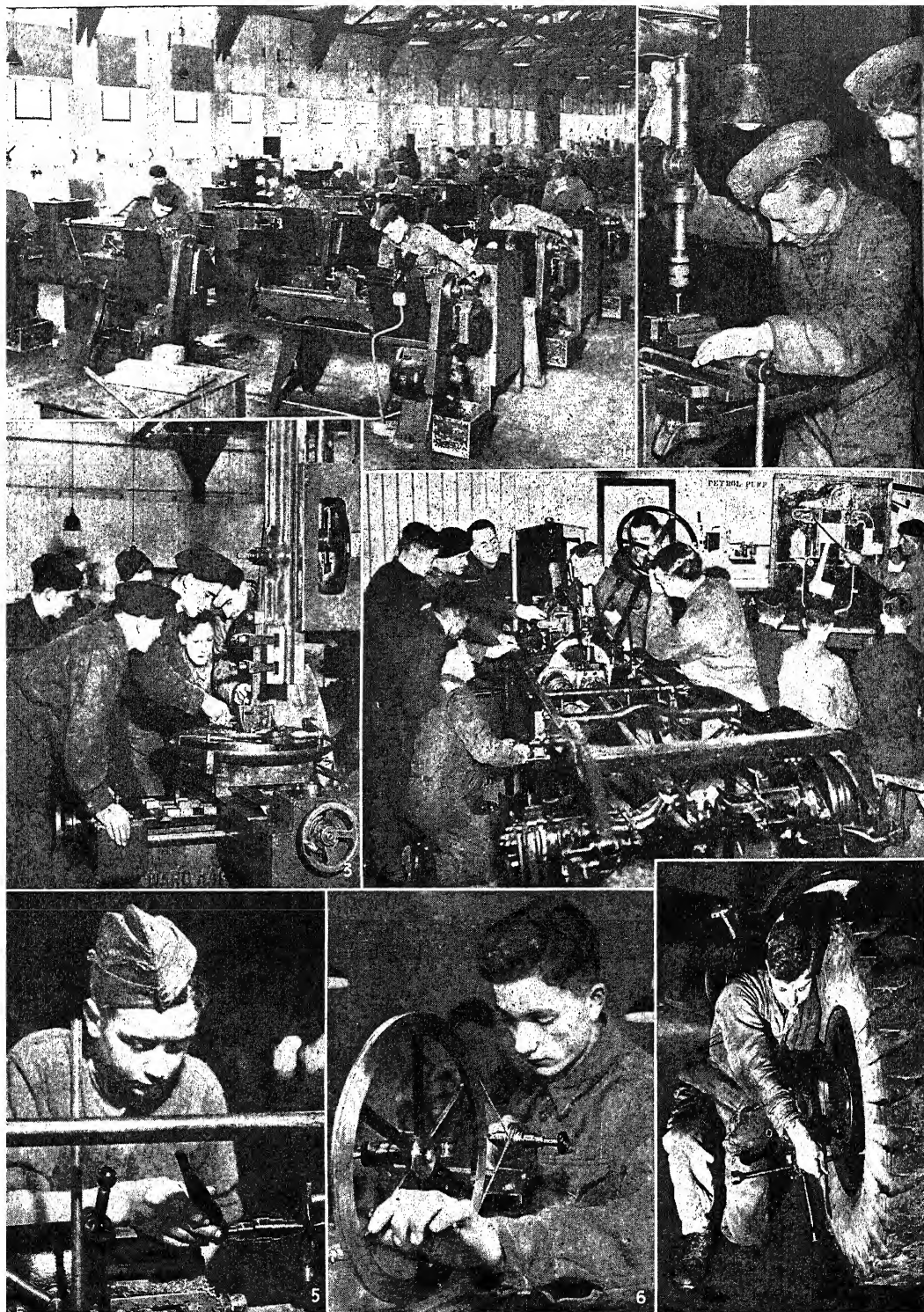
The German army was equipped in 1914 with a large proportion of machine guns, whereas the British had only two per infantry battalion. Apart from this, British equipment and organization were well suited to the opening stages of the war. A Machine Gun Corps was formed at an early date to remove the deficiency. But it was soon evident that trench warfare was setting in and that the power of the defence outstripped that of the offence. No attacks could be carried out without prodigious losses. All armies therefore proceeded to equip



1. Marching in "threes" the basis of the soldier's training is still the parade ground. 2. Infantryman's battle dress, 1940. 3. Royal Artillery in training with modern gun 4. Royal Engineers learning the art of

camouflage; at a distance of 10 yards they could not be detected. 5. Anti-tank gunners show how a gun is put in readiness for action. 6. Rehearsing a bayonet trench attack after pushing through scrub and wire

ARMY: SOME ASPECTS OF THE TRAINING OF TROOPS IN THE CRAFTS OF WAR



Technicians of all kinds are needed in the modern British army, and boys from the age of 14 are accepted for training. 1. Apprentices in a machine shop. 2. Learning how to use a drill. 3. Instruction on a slotting machine.

4. R.A.C. recruits study the internal combustion engine at an army school of tank training. 5 and 6. Apprentices at work on lathes. 7. And embryo M.T. craftsman changes the wheel of an army lorry

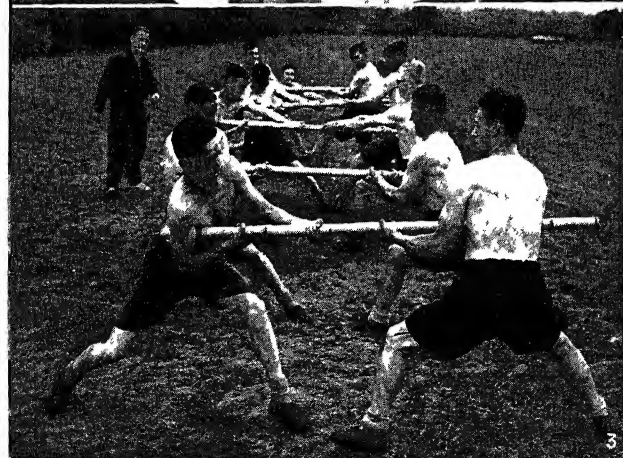
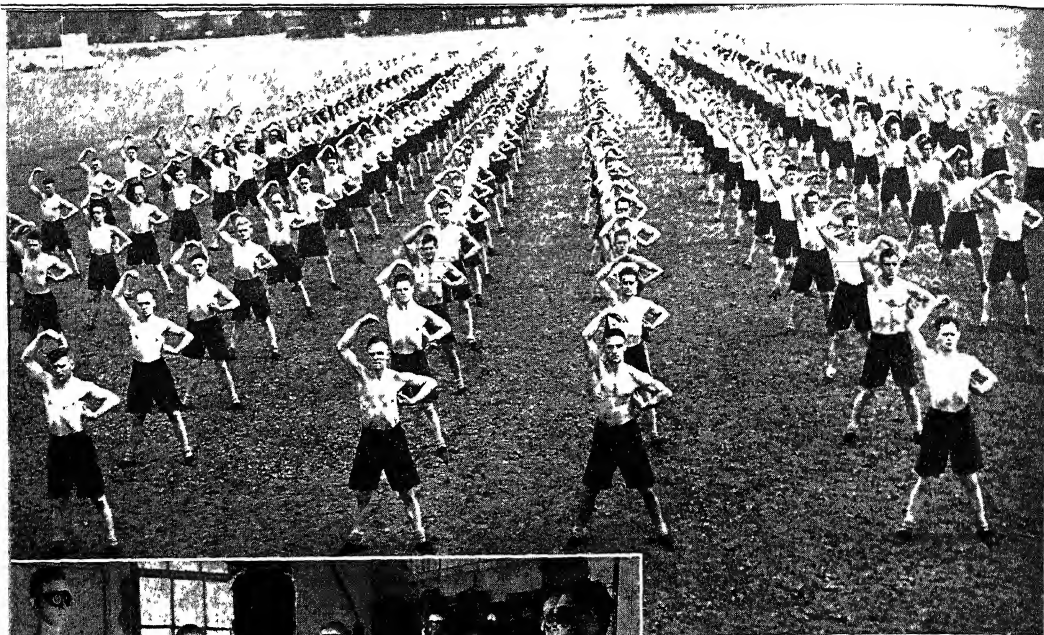
ARMY: TECHNICAL TRAINING FOR FUTURE HANDYMEN AND SPECIALISTS



1. Under the army education scheme art classes are available to both men and women of the army. 2. The training of army butchers includes microscopic examination of moulds. 3. Soldiers in a modern army mess. 4. Geography

lesson at an Army Educational Corps school. 5. Symphony orchestra of the Eastern Command. 6. Soldiers learning bricklaying at the trade training wing of the School of Military Engineering, South Eastern Command

ARMY - VARIED PURSUITS IN THE LIFE OF THE BRITISH SOLDIER OF TODAY



1. Physical exercises are a great aid to fitness, and today bulk largely in the preliminary training of the troops
2. Actino-therapy, or artificial sunlight, given at an army physical development centre, has proved of high value

in building up men who are below the A1 standard of fitness. 3. Recruits undergoing physical training at a northern depot. 4. Army P.T. instructor taking a sturdy pupil over the vaulting-horse at a gymnastic class

ARMY: HOW THE BRITISH SOLDIER ACQUIRES HIS PHYSICAL FITNESS

themselves with artillery on a far greater scale to blast a way through these defences. This did not prove a satisfactory solution. Not only was the enemy able to re-form his machine-gun belt behind the area thus attacked, but the effect of the shell fire on the ground was such that the attackers had great difficulty in bringing up supplies over this terrain.

The solution of the problem was eventually found in the use of tanks, which appeared on the battlefield in Sept., 1916. The new formation which was to man these weapons was originally known, for the purposes of secrecy, as the Heavy Branch Machine Gun Corps. After the weapons had been used in battle and there was no need for further secrecy it became the Tank Corps.

Transport, until after the South African war, had been wholly horse drawn, but by 1914 motor lorries had been introduced. They had solid tires, and were confined to use on main roads. Only the third line transport carrying supplies and ammunition in the first stage beyond a railhead could therefore use mechanical transport. In the forward areas nothing but horse transport was used. As the war progressed a great strain was placed on British shipping capacity in bringing from overseas all the fodder necessary for horses. Shipping space required for petrol was far less. Attempts were therefore made to extend the use of mechanical transport and tractors in the forward areas. Tractors could carry supplies over shell-torn ground that was impassable by horse transport. A great increase in the use of mechanical transport in the forward battle areas would have been seen had the war continued into 1919.

Chemical warfare, though it played a considerable part in the First Great War, had no great effect on the organization or employment of the armies generally.

Between the Wars

The armistice of 1918 was followed by the normal process of demobilisation. By Oct. 15, 1919, the strength of the army had fallen to 757,000. The annual army estimates for 1919-20 allowed for 400,000 men, the total cost of the army being 405 millions. The method of recruiting and the general form of the army organization gradually returned to much the same position as before 1914.

But it was clear that great changes would have to take place

in the shape of future armies. The value of utilising the power of the internal combustion engine rather than relying on the muscular power of man and horse had already been seen in the matter of transport. The tank was entirely dependent on engine power. Now that power was to be used to increase efficiency in a large number of other ways. Some interesting figures were prepared. For instance, an army which used nothing but mechanical transport for all purposes could move 10 m. every day and consume only one quarter of the tonnage in petrol compared with the weight of fodder required if the army used horse transport. Armies seldom move 10 m. a day over a long period; and, when halted, the mechanical transport uses no petrol, whereas horse transport demands constant forage.

Mechanisation also showed great saving in man power, the weapons being transported mechanically and not man-handled. The numbers of men required to work one weapon in various corps were as follows: field artillery, 14 men per field gun; machine gun corps, 6 men per gun; tank corps, 1.6 men per weapon in the tank. It was therefore certain that all armies in future would use a gradually increasing measure of mechanisation for the purposes of both transport and fighting.

Mobile and Heavy Forces

As regards the general organization of an army, it has always been recognized that armies contain two types of forces, for fulfilling two rôles. The first of these contains troops capable of pushing out ahead, gaining touch with the enemy, finding his flanks, attacking wherever the enemy is found to be weak, and pursuing him. The other type contains the slower-moving, harder-hitting troops whose duty it is to hold and attack strong defensive positions and secure the ground gained by the mobile troops. The former had always been light cavalry, the latter had been infantry assisted at times by heavy cavalry. The new power of mechanisation was now ready to assist the forces used in both rôles.

As a result of the progress made in mechanisation, the army had reached by 1939 the following position. The mobile rôle was to be carried out by armoured divisions. These contained all arms, and motorised transport was used throughout. They had two armoured brigades, each

containing three armoured regiments equipped with fast tanks having a long circuit of action but only a limited weight of armour. For the harder fighting rôle the infantry were to be assisted by tank brigades equipped with tanks which had less speed but heavier armour.

Motorisation had been adopted for every type of army transport. Not only did this greatly increase tactical efficiency, but it revolutionised all ideas about the strategic mobility of armies. With the introduction of motorised transport there were no men in the division who marched except the infantry, and a reserve of lorry companies was kept so that even they could be moved by mechanical transport when desirable. Either the armoured or the infantry division could then move 100 m. a day with ease.

But although plans had been progressive during the period between the wars, financial stringency had prevented any real progress being made in raising and equipping the forces. At the outbreak of war in 1939, there was only one armoured division in being, and that was only half equipped. Five regular divisions and one army tank brigade were more or less equipped, but some had received little training with this equipment. Moreover, under the peace-time voluntary recruiting system divisions at home were very much under establishment strength and the numbers had to be made up with half-trained men.

Hore-Belisha's Changes

The appointment of L. Hore-Belisha (*q.v.*) as secretary of state for war in 1937 put new heart into the army. For the first time the army was advertised and explained to the public. Recruiting increased. The Military Training Act of 1938 introduced compulsory service, 200,000 men being registered. They came into the training camps in July, 1939, and were known as militia men, in avoidance of the unpopular word conscript. The women's corps known as the Auxiliary Territorial Service (*q.v.*), popularly known as the A.T.S., was already in being, having been formed in Sept., 1938, at the time of the so-called Munich crisis.

In the summer of 1939, Hore-Belisha doubled the Territorial Army (renamed thus since 1921), and the numbers filled up rapidly with volunteers, but they were behind in training and

equipment. The first formations to be made from these forces were nine divisions, three motor divisions (which did not differ very materially from a normal division), and two armoured divisions. In addition five army tank brigades and seven mechanised divisional cavalry regiments were to be formed. These territorial forces were to supplement the one armoured and five regular divisions at the earliest possible moment, and others would follow when equipment became available and the men had been trained. There were, of course, other calls on these forces, such as the formation of anti-aircraft divisions.

Second Great War

The B.E.F. which moved to France in Sept., 1939, was initially composed of two corps, each of two regular divisions; and with the administration and line of communication troops it numbered 222,000 men. Although so little time had been available for training with this great quantity of new mechanised equipment, the advance up to the front from the base ports was carried out without a hitch. It consisted of a movement of about 150 m. to the assembly area, then a march of 250 m. to the forward area. These movements were carried out in two days with one intervening day for maintenance. A third corps arrived later, and the strength of the B.E.F. then consisted of five regular and five territorial divisions.

The armies of other great continental nations had been only partially motorised. The greater part still used horse-drawn transport and were not very different in form from the armies of 1919; but they all possessed a mechanised portion of their armies which made full use of armour and of motorised transport. The Germans had 8 fully trained and equipped armoured divisions and a number of motorised divisions to cooperate with them.



Army. The new walking-out dress (cavalry) proposed in 1946

The French had six divisions containing both armoured and motorised troops. The British had little armour, but the regular divisions were well trained and had full strategical mobility, their transport being entirely motorised.

The Germans kept their highly trained mechanised forces in hand ready to strike through to the heart of France. Our highly trained motorised forces should have been kept in hand to counter such a threat, but they were put in to hold trench lines and no use was made of their mobility. The success of the Germans in 1940 with the drive of their highly mobile armoured divisions, supported by motorised divisions to secure the ground gained, was a complete proof of the power of this modern type of army.

During 1941 the British army was at last built up on lines that the army itself had long desired. The main policy remained unchanged. There were to be eight armoured divisions as mobile troops, and more were to be raised at a later date. These divisions contained all arms of the service, but they were reorganized to contain one armoured and one infantry brigade. This proved to be a well-balanced formation, and the organization was retained till the end of the war. Little change was made in the infantry division, and there were ten divisions training at home. To support these divisions in close and heavy fighting, ten army tank brigades were raised. These were equipped with heavy tanks suitable for this rôle.

That this policy was sound was amply proved in the Middle East in 1941 and 1942. The mobile troops in the form of the armoured divisions carried out the greater part of the work, but heavy attacks had to be delivered at times with infantry formations supported by their heavy tanks. During this early period the British were driven back at times by enemy forces greatly superior in strength and better equipped. But towards the end of 1942 new British forces, well trained and equipped at home, began to arrive in the Middle East; and from that time they were never defeated.

An outstanding development of the Second Great War was the use of landing craft to enable all arms, including tanks, to land on beaches without any difficulty or delay. These developments enabled the British and U.S. armies to land successfully in N. Africa, Sicily, and Normandy, and

finally to cross the Rhine. (See Amphibious Craft, illus. p. 401.)

Another outstanding development was in the widespread use of wireless telephony. This was particularly marked in the work of the armoured units.

In the later stages good use was made of airborne forces.

Post War Changes

In 1946 tentative proposals were made for a radical regrouping of infantry into 15 corps based upon regimental, territorial, or traditional affinity, certain battalions being placed in "suspended animation" for 10-15 years. These proposals were modified in 1947 by substituting the retention of such battalions in skeleton form. At the same time, two special training battalions were formed to provide a pool of n.c.o.s for the infantry service battalions. Since Jan. 3, 1947, the Royal Military Academy, Woolwich, and the Royal Military College, Sandhurst, have been combined to form at Sandhurst the Royal Military Academy, through which officers for all branches now pass.

Army Air Corps. British army unit, formed Feb. 24, 1942, to simplify the administration of



Badge of the Army Air Corps

Army airborne units in such matters as equipment, training, records, pay, family allowances, etc. Previously these details had been controlled by the regiments from which airborne units were drawn. The first regiment brought within the scope of the A.A.C. was the Glider Pilot Regiment (q.v.), which had been formed in Dec., 1941. Eventually, the A.A.C. administered the Parachute Regiment (q.v.), comprising some 20 battalions; the Special Air Service Regiment (q.v.); the Special Raiding Squadron; and the Army Parachute Training Section. The cap badge of the A.A.C. consists of a laurel wreath surmounted by a crown, and within the wreath an eagle standing on the letters A.A.C.

Army Airfield Construction Group. British army unit, formed in 1942 from Royal Engineers and Pioneer Corps personnel for the building and maintenance of forward airfields. During the 1944 campaign in France, one unit covered 200 m. in one week and made 14 airfields fit for use.

Twenty airstrips and emergency aerodromes were built during the first two weeks of the campaign in Normandy.

Army and Air Force Act. Code of discipline for officers and men of the Army and Royal Air Force, and applicable to certain classes of civilians in respect of billeting, impressment of transport, etc. The Act was introduced in 1881 for only one year; and to make it operative it needs the sanction of another Act called the Army (Annual) Act, thus securing the constitutional principle of parliamentary control over the army. This annual Act lays down the number of troops to be maintained, and also amends the Army Act from time to time. The Army Act is divided into parts headed discipline, enlistment, billeting, saving provisions, definitions, etc. It is the authority for all that concerns courts-martial and courts of inquiry, and it enables the crown to make rules of procedure and regulations as to the persons to be invested with command over the forces. It was passed two years after the abolition of the Mutiny Act and Articles of War. It became the Army and Air Force Act in April, 1918, following the establishment of the R.A.F.

Army and Navy Club. Social club for officers of these two fighting services. It was established in London in 1838, and has about 2,600 members. The entrance fee is £15 and the annual subscription 14 guineas. It is familiarly called "The Rag." The clubhouse is in Pall Mall, London, S.W.

Army Blood Transfusion Service. British army unit, established 1939 as a result of experience reported in the Spanish civil war. As operated during the Second Great War, it had a base headquarters, advanced blood bank, and the field transfusion units which worked with advanced dressing stations. The blood, donated by civilian and Service volunteers, was supplied in three forms: stored blood, which can be kept for a month in a refrigerator; fluid plasma; and dried plasma. Both liquid and dehydrated blood were sent by air to all theatres of war and also dropped by parachute to isolated units. R.A.M.C. personnel of the Army Blood Transfusion Service worked with troops in forward battle areas. See Blood Transfusion.

Army Bureau of Current Affairs. Institution formed in Sept., 1941, under the direction

of W. E. Williams, director of the British Institute of Adult Education. The bureau's first weekly bulletin was issued Sept. 20. The bulletins were issued to units, and their contents formed a basis on which regimental officers were able to organize discussions. Each bulletin contained an article on some current topic, an outline brief for discussion groups, and a quiz. Every fortnight the bureau issued a map review, consisting of map and photographs dealing with a topic of the moment. There were also travelling exhibitions, panels of qualified lecturers, and an A.B.C.A. play unit which performed its own plays dealing with current affairs. The Army Council ordered one hour of training time weekly to be devoted to A.B.C.A. discussions. In April, 1946, the Army Bureau of Current Affairs became the Bureau of Current Affairs under the Carnegie Trust (*q.v.*).

Army Cadet Force. Organization for citizenship and pre-service training for boys between the ages of 14 and 18. The Junior Training Corps and the Senior Training Corps are not part of the Army Cadet Force, but are run in conjunction with boys' schools and administered directly from the War Office. The Army Cadet Force proper is directed through the county cadet committees, who, in turn, receive instructions from the War Office. (See Cadet.)

Founded towards the close of the 19th century, the Army Cadet Force had a chequered history until the Second Great War, when service in cadet units was much encouraged in certain schools for all boys of the requisite physical fitness. Units continued to be run in conjunction with the schools, but other units were in existence for boys who had left school. School and open units receive a grant of 15s. per cadet per annum, and the boys are provided with free uniform. Each unit is affiliated to the local regiment, and the boys must perform a specified number of drill hours per year and, where possible, a period of instruction in camp or at an army depot. During the Second Great War, an average of 100,000 boys attended camps each year.

Army Catering Corps. British army unit, formed May 12, 1941. Officers were all experts in cooking or dietetics, and drawn as far as possible from civilian catering establishments. Personnel underwent specialised training and had tests at a central school



Badge of Army Catering Corps

of army cookery, being then posted to units.

Army Council. Controlling body of the British army. Established in 1904, when the office of commander-in-chief was abolished, it is, in constitution, something like the Board of Admiralty. It consists usually of nine or ten members. The civilian members are the secretary for War, who acts as president, the under-secretary, and the financial secretary to the War Office. The military members include the chief of the Imperial General Staff, the quartermaster-general, the adjutant-general, the master-general of the ordnance, and the deputy chief of the Imperial General Staff.

Army Dental Corps, ROYAL. British army unit, formed in 1921 from R.A.M.C. personnel. Dental officers, assisted by surgery assistants and dental mechanics, provide routine inspection and treatment in mobile dental units. The prefix Royal was awarded to the corps in Dec., 1946.

Army Educational Corps, ROYAL. British army unit established in 1920 to replace the Corps of Army Schoolmasters formed in 1864. Recruits must possess university degrees or other recognized qualifications for teaching. All entrants, who are either enlisted direct from civil life or transferred from other units, are given three to six months' specialised training before qualifying as sergeant-instructors. Vocational training of men for discharge was a function of the corps until 1937, when the ministry of Labour became responsible, and the A.E.C. devoted itself to general education. The prefix Royal was awarded to the corps in Dec., 1946.

Army Film and Photographic Service. British army institution. The Army Film Unit was brought into being in Nov., 1940, in order (1) to provide cinematograph records for the War Office; (2) to publicise the British soldier; (3) to provide secret material for military intelligence. The unit covered the fire of London, Dec. 29, 1940, and the first commando raid on the Lofoten Islands.

In Nov., 1941, it was decided to increase the scope of the A.F.U.,

and the unit became known finally as the Army Film and Photographic Service. At its peak period, some 400 officers and men were serving the army with cameras — both cinematograph and still. A.F.P.U. personnel served in all theatres of operations, i.e. the Western Desert, North Africa, Sicily, Italy, Malta, France, Belgium, Holland, Germany, Burma, etc. and the unit produced such outstanding campaign films as *Vaagso*, *Desert Victory*, *George Cross Island*, *Eve of Battle*, *Left of the Line*, *Harbour Goes to France*, *Burma Victory*.

Army Fire Service. British army unit, developed from the fire-fighting units normally attached to military establishments.



Badge of
Army Fire Service

The Army Fire Service was reorganized and expanded during the Second Great War and placed under a lieutenant-colonel designated inspector of fire services. Recruits were mostly civilian firemen, but all were sent to a central school in N. England for training with equipment and vehicles specially designed for use in dock fires and in areas fired as a result of enemy action. Vehicles and fireboats enabled the Army Fire Service to cover all military operations overseas and to safeguard vast quantities of petrol, stores, and shipping at base. Units particularly distinguished themselves in North Africa and Italy and were amongst the first troops to land on the Normandy beaches in 1944. Every man underwent the normal infantry training course. The unit's shoulder badge consists of a round flash, 2½ ins. in diameter, with a red background, a blue ring, and a yellow star, and the words *Army Fire Service*.

Army Kinematography Service. British army institution, established under the War Office in Aug., 1940, to develop the use of sound films in the training of



Army Film and Photographic Service. Cameraman, accompanied by a bodyguard, recording a bombardment
Photo, British Official, Crown copyright reserved

troops. Over 1,000 films were produced during the Second Great War, and covered every aspect of military training. They showed the mechanism of artillery, and training in tank tactics. The theory and application of sighting for A.A. artillery was the subject of a series of films, as was the detection and immobilising of land mines and booby traps. A special series was produced for the instruction of the Home Guard, illustrating various methods of street fighting.

Army List. Document constituting legal evidence of the status and rank of officers of the army, including the Royal Marines. It also includes warrant officers of the rank of schoolmasters, master gunners, bandmasters, conductors, and the different classes of serjeant-major. The monthly army list is published at 5s. and is in common use; the quarterly list costs 6s. and is often called the birthday book, as it shows the ages of officers, the dates of their commissions, and promotions. From June, 1915, until early in 1919, and again from Sept., 1939, throughout the Second Great War, the Army List was regarded as a confidential document, its sale to the public being suspended.

Army Medical Corps, ROYAL. Information about this unit of the British Army will be found under Royal Army Medical Corps. The same applies to other army units honoured with the prefix Royal, before Dec., 1946, e.g. ARMY ORDINANCE CORPS; ARMY PAY CORPS; ARMY SERVICE CORPS; ARMY VETERINARY CORPS.

Army Physical Training Corps. British army unit, established at Oxford in 1860 as the Army Gymnastic Staff, and consisting of one officer and 12 other ranks. In 1906 the Gymnastic

Staff evolved the Army physical training system based upon Ling's Swedish drill. During the First Great War the staff was expanded to 2,000 officers and men, and in 1918 was renamed the Army Physical Training Staff. Between 1939 and 1945 it increased to 147 officers and 3,200 specialist instructors. It was created a corps in 1940. Personnel of the corps are responsible for training all arms of the service in physical exercises and give instruction in bayonet fighting and unarmed combat. They also train airborne, parachute, and commando troops, and organize teams for sports.

Army Pigeon Service. British army institution. It is administered by the Royal Corps of Signals for the transmission of messages where it is impossible or inadvisable to use radio. Pigeons were used during the siege of Paris in 1870, and during the First Great War on the western front and in Egypt and Iraq.

Each Army Pigeon Service unit is in control of an officer accustomed to handling pigeons in civil life, and most of the 250,000 birds used in the Second Great War were lent by fanciers for the duration of the war. They were used in all theatres in 1939-1945, and of the vast number of messages sent, only 5 p.c. failed to arrive. Carried in protective containers, pigeons were dropped with parachute troops and released with news of the landing or other operations. The first reports of the Dieppe raid, Aug. 19, 1942, reached Great Britain by a pigeon. Large numbers of birds were used by the R.A.F. and proved invaluable in bringing help to aircraft which crashed in lonely spots. *See Animal: Employment in Wartime.*

Army Plot. Name given to a proposal for bringing the English army from the north to London to aid the cause of Charles I. In May, 1641, England was excited, wild rumours were afloat, there was disorder in London, and the queen, Henrietta Maria, was suspected of asking aid from France. On May 5, therefore, in Parliament, Pym declared there was an Army Plot: the army was to be brought to London to threaten Parliament and French troops were to land at Portsmouth. This was an exaggeration. The matter had been discussed, but there was no definite scheme. Measures of protection were taken by the House of Commons and the plot came to nothing. A second Army Plot a little later also petered out. *See Charles I.*

Army Post Office. Unit of the Royal Engineers which establishes and maintains postal communication between Great Britain and the army and air forces abroad, and within the commands overseas. The first army postal service for British troops serving abroad was set up in 1706, when John Macky, packet agent at Dover, was commissioned by the War Office to organize better deliveries to and from the troops in Flanders. In 1854 an army postmaster was appointed to supervise military postal services in the Crimea. The first Army Post Office Corps to be recruited from military personnel accompanied the expeditionary force to Egypt in 1882: the unit was staffed by men from the Middlesex Post Office Rifle Volunteers.

An Army Post Office functioned throughout the Boer War (1899-1902), and proved so successful that postal personnel were placed in a special reserve of Royal Engineers (Postal). Called up and expanded in the war of 1914-1918, this reserve maintained base and field post offices in all theatres of military operations. It provided personnel for China (1923-1930) and in Palestine (1935-1937). In 1926 army postal personnel were reorganized as Special Supplementary Reserve R.E. (Postal) and recruiting restricted to Post Office employees. At the outbreak of the Second Great War the Army Post Office had a nucleus strength of 270 all ranks, and by 1945 had expanded to 7,000, including members of the A.T.S.

Military mail posted in the United Kingdom is concentrated at a central army postal depot, sorted for individual units, and

dispatched to the commands overseas. Command sorting centres then forward the mail to divisional and brigade field post offices for distribution. The larger field post offices provide all normal facilities such as the sale of stamps, the issuing and cashing of postal orders, and the registration of mail.

During the Second Great War 13,000,000 outgoing items of mail were handled each week by the Army Post Office. Air and surface mail services were maintained to all parts of the world where British forces were stationed. Letters were sent to Malta and the Dodecanese Islands by submarine and dropped by parachute to advanced formations in Burma.

Army Reserve. Trained soldiers allowed to quit the colours on condition of engaging to rejoin in time of national emergency. In the pre-war British army every soldier enlisted for 12 years, but as only a certain number of men can appear on the pay roll in any one year, according to the establishments sanctioned by Parliament in the Army (Annual) Act and the votes in Army Estimates, men who had completed about six years with the colours were granted a permanent furlough on half-pay for the remainder of the term, their places in the ranks being taken by recruits. This was called the short service system.

On Sept. 19, 1938, the War Office announced the formation of a special section of the Army Reserve for pensioner warrant officers and n.c.o.s. Enlistment in the new reserve was opened to ex-soldiers who had been discharged on pension. Approved candidates were re-enlisted for a year, with re-engagement

annually. In 1948 the formation of new emergency reserves for all three services was announced. These would consist of men with previous service in the Royal Navy, Army, and R.A.F., volunteering for immediate recall in an emergency. Personnel would not be liable for training in peace-time.

Army Survey Directorate. Branch of the Royal Engineers responsible for providing combat units with up-to-date maps of the enemy's territory, and dispositions of his artillery, troops, minefields, trenches, and defended localities. Mobile map-producing units accompany troops in the field. A mobile unit consists of a drawing office and printing press, surveyors, cartographers, and draughtsmen.

Three days before the battle of Alamein front line troops possessed maps showing every enemy gun position and minefield. Over 3,500,000 maps were printed by the Army Survey Directorate in Cairo for the invasion of Sicily, and the troops who went ashore in Normandy were provided with coloured maps of all the German coast defences. At home stations the Army Survey Directorate works in close conjunction with the Ordnance Survey (*q.v.*), and during the invasion threat in 1940 some millions of maps were issued of the localities likely to be the scene of fighting.

Army Welfare Services. British army institution. Controlled by a directorate at the War Office under the department of the adjutant general to the forces, Army Welfare Services are divided into three main branches: (1) general, which includes canteens, clubs, hostels, legal aid, and soldiers' personal problems; (2) entertainment, including plays and broadcasting; (3) army newspapers, the syndication of news services, and the supply to units of recreational books, periodicals, and newspapers.

All army welfare officers at home stations hold voluntary and unpaid appointments. A command welfare officer of the rank of colonel is appointed in every command and attached to the staff of the G.O.C.-in-C. He is assisted by an administrative staff and works in cooperation with the county and local army welfare officers appointed by the Territorial Army Associations in consultation with G.O.C.-in-C. commands. Local army welfare officers help soldiers and their families in their home towns. Army welfare officers overseas are paid.



Army Post Office. Members of the A.T.S. sorting parcels, etc., at an army postal depot in the Midlands during the Second Great War

Arnaud, HENRI (1641-1721). Leader of the Piedmont Waldenses. Born at Embrun, he studied at Basel and Geneva, and became pastor to the Vaudois at La Tour. On the expulsion of the Vaudois by Victor Amadeus of Savoy, Arnaud organized and commanded the military expedition, 1689, for their return from Switzerland, but from 1690-8 he cooperated with Victor Amadeus against the French. When Amadeus again turned against the Vaudois, 1698, Arnaud took refuge in Württemberg, and became pastor near Stuttgart. He visited England, 1707, and died at Schönenberg. He was author of the *History of the Glorious Return of the Waldenses to their Valleys*, 1710, Eng. trans. H. Dyke Acland, 1827. See *Waldenses*.

Arnaud, YVONNE (b. 1892). Anglo-French actress. Born at Bordeaux, Dec. 20, 1892, she



Yvonne Arnaud, Anglo-French actress

spent her early years in the study of music and gave piano recitals in Europe and America, being acclaimed as a youthful prodigy. She first appeared on the stage at the Adelphi Theatre, London, in 1911, in *The Quaker Girl*, and subsequently appeared in musical plays, farces, and comedies. In 1926 she scored a great success as Mrs. Pepys in *And So To Bed*. In 1928 she played Elizabeth in *By Candlelight*, and subsequently appeared in British films. One of her greatest successes was as Mrs. Frail in Congreve's *Love for Love* in 1943-44.

Arnauld, ANTOINE (1612-94). French theologian. The 20th child of a distinguished French lawyer of the same name, he was born in Paris, and studied law at the Sorbonne. This he abandoned for theology, and was ordained in 1641. Supporting Jansen, bishop of Ypres, he attacked the Jesuits, and his book on *Frequent Communion*, a practice he opposed save after very rigid preparation, at once provoked controversy.

When Jansen's work was condemned as Calvinistic by Rome, Arnauld denied that interpretation and the power of Rome to decide on questions of fact. The Jesuits took the opposite view and procured his exclusion from the Sorbonne in 1655. Arnauld made outward submission in 1664, but lived at Port-Royal and remained

Jansenist. In 1678 he retired to the Netherlands, and wrote in opposition to the Jesuits, the Protestants, and William of Orange. He died at Brussels, maintaining to the last that the Jansenists were misunderstood. His eldest brother, Robert Arnauld d'Andilly (1588-1674), lived as a layman at Port-Royal. He was a poet and the author of works on history and theology. Another brother was Henri Arnauld (1597-1692), bishop of Angers, who had a long struggle with the Jesuits.

Arnauld, JACQUELINE MARIE ANGÉLIQUE (1591-1661). Abbess of Port-Royal. Often known as



J. M. A. Arnauld, French abbess

Philippe de Champagne

Mère Angélique, she was the second daughter of the twenty children of the Paris advocate Antoine Arnauld. In 1599 she became a novice in the Cistercian convent of Port-Royal, near Versailles, and at the age of eleven was nominated abbess by her father. In 1608 she was moved by a sermon to restore the old discipline, which had become very relaxed. In 1623 she came under the influence of the Jansenist abbot of St. Cyran, du Vergier. After resigning to become head of a convent in Paris, she eventually returned to Port-Royal as prioress under her sister Agnes. Her niece, Angélique Arnauld (1624-84), became successively prioress and abbess of Port-Royal, and was chief author of the *Memoirs of Port-Royal*, 1742. See *Port-Royal*; consult also Angélique Arnauld, Abbess of Port-Royal. F. Martin, 1873.

Arnaut of MAREUIL. A French troubadour who flourished at the end of the 12th century. Born at Mareuil, in Périgord, he appeared with great success at the court of Raymond V, count of Toulouse, and subsequently settled at the court of William VIII, lord of Montpellier. His poems are simple in form and abound in delicate sentiments. Petrarch, comparing him with Arnaut Daniel, calls him "the less famous Arnaut," though this opinion was not shared by his fellow troubadours, and is not endorsed by later criticism. He is regarded as having introduced the salut, or amatory epistle, into Provençal poetry.

Arndt, ERNST MORITZ (1769-1860). German poet and patriot. Born in the island of Rügen and educated at Stralsund and



E. M. Arndt, German poet and patriot

the universities of Greifswald and Jena, he became professor of history at Greifswald in 1805. The son of a former serf, he first attracted attention by the publication in 1803 of an attack on serfdom in Pomerania and Rügen, which led to its abolition. After the battle of Jena, 1806, he was driven to seek asylum in Stockholm for his criticism of Napoleon in his *Spirit of the Time*, 1807, and in 1812 he went to Russia, where he was associated with Stein in organizing the coalition against Napoleon.

At this time Arndt wrote various songs and poems, including the famous *What is the German's fatherland?*, which helped largely to revive the spirit of nationalism in Germany. In 1818 Arndt was appointed professor of history at Bonn, but he was soon suspended for his outspoken liberal opinions, and from 1819 until 1840 lived in retirement. At the revolutionary movement of 1848 he was elected to the national assembly at Frankfurt, but retired the following year. He died at Bonn, Jan. 29, 1860. See *Life and Adventures of E. M. Arndt*, J. R. Seeley, 1879.

Arne, THOMAS AUGUSTINE (1710-78). British musician. He was born at King Street, Covent Garden, London, March 12, 1710, and



Thomas A. Arne, British musician

educated at Eton. His first composition was the music to Addison's opera *Fair Rosamond*, 1733. He was the composer of two oratorios, *Abel*, 1755, and *Judith*, 1761, of the music to Milton's *Comus*, 1738, and of many operas and operettas, in addition to the music for plays of Shakespeare and others. His *Rule Britannia*, in The

Masque of Alfred, 1740, and the Shakespearean songs, Under the greenwood tree; Blow, blow, thou winter wind; When daisies pied, and Where the bee sucks, are immortal contributions. Arne died March 5, 1778, and is buried in S. Paul's, Covent Garden, London. His sister Susannah (1714-66), Mrs. Cibber, was a famous contralto for whom Handel wrote many arias. Consult Doctor Arne, H. Langley, 1938.

Arnee. Native name for the long-horned Indian buffalo. It is found wild in many parts of India,



Arnee, or long-horned Indian buffalo

where it lives in swampy jungles, but is better known in the domesticated form, of which there are many breeds.

Arnemuiden. Town on Walcheren Island, Zeeland prov., Holland. It is 4 m. E. of Middelburg, at one end of the causeway connecting with Beveland. During the reconquest of Walcheren (*q.v.*) from the Germans late in 1944, the enemy commander broadcast on Nov. 4 a suggestion that Arne-muiden should be treated as an open town on account of the many German wounded in makeshift hospitals there. This was agreed to by the British commander, and R.A.M.C. personnel entered Arne-muiden under a white flag on Nov. 5 to seek out British wounded.

Arnhem or ARNHEM. Town of Holland, capital of Gelderland. It stands on the Rhine, 35 m. by rly. E. of Utrecht, is connected by tram with that city and Zutphen, and by steamer with Amsterdam, Rotterdam, Cologne, and other ports. It manufactured tobacco, cotton and woollen goods, paper, soap, furniture, and carriages. A well-built town, beautifully situated, it had fine old churches, a quaint town hall, and monuments to the dukes of Gelderland, all destroyed in the Second Great War. Sir Philip Sidney died here in 1586. The Roman Arenacum, it was often captured, destroyed, and refortified. The French took it in 1672 and 1795, and the Prussians in 1813. The officers who fled with the Kaiser at the end of the First Great War were interned here. Pop. 99,056.

ARNHEM: AIRBORNE EXPEDITION, 1944

Eric Phillips, War Correspondent, N.W. Europe, 1944-45

This article describes the great Allied attempt in Sept., 1944, to turn the Siegfried Line with the help of airborne forces, and explains how and why it met with only very limited success, despite a resistance that has added a further page to the long story of British courage and endurance. See Europe, Liberation of

At Arnhem in Sept., 1944, the British 1st airborne division performed a memorable feat of arms, fighting for nine days and eight sleepless nights against heavy German odds in an effort to keep a footing in the town until reinforced by the British 2nd army. All attempts to reach them with adequate ground support were unavailing and in the end the remnants were withdrawn across the Lower Rhine. Thus they failed, though magnificently, in their primary object; but to make a just estimate of what they did it is necessary to consider the whole operation of which their task was part.

By the second week of Sept. the thrusts of the 2nd army over the Seine and Somme to Brussels and Antwerp, thence N.E. to Holland, had uncovered a dazzling strategic prospect. It was the possibility of reaching the Zuyder Zee: thus cutting off the German forces in western Holland and at the same time getting into position to turn the right of the Siegfried Line and invade Germany north of the Ruhr. Gen. Eisenhower made the bold decision to attempt it.

Three wide rivers were the main obstacles to the 2nd army's progress: the Meuse, which in Holland becomes the Maas; the Waal, or main lower branch of the German Rhine, and the Lower Rhine itself. To secure, in advance of the ground troops, the main axis of the thrust through Eindhoven, and especially the bridges carrying the road across the rivers at Grave, Nijmegen, and Arnhem, an Allied triple airborne operation was planned. The British veteran 1st div. with the Polish parachute brigade, and the U.S. 82nd and 101st airborne divs. were detailed, and to the British and Polish fell the task of seizing the bridge and town of Arnhem, the most northerly objective. It was calculated that the airborne troops after landing could hold their positions

for 48 hours pending the arrival of ground forces with the heavier support weapons.

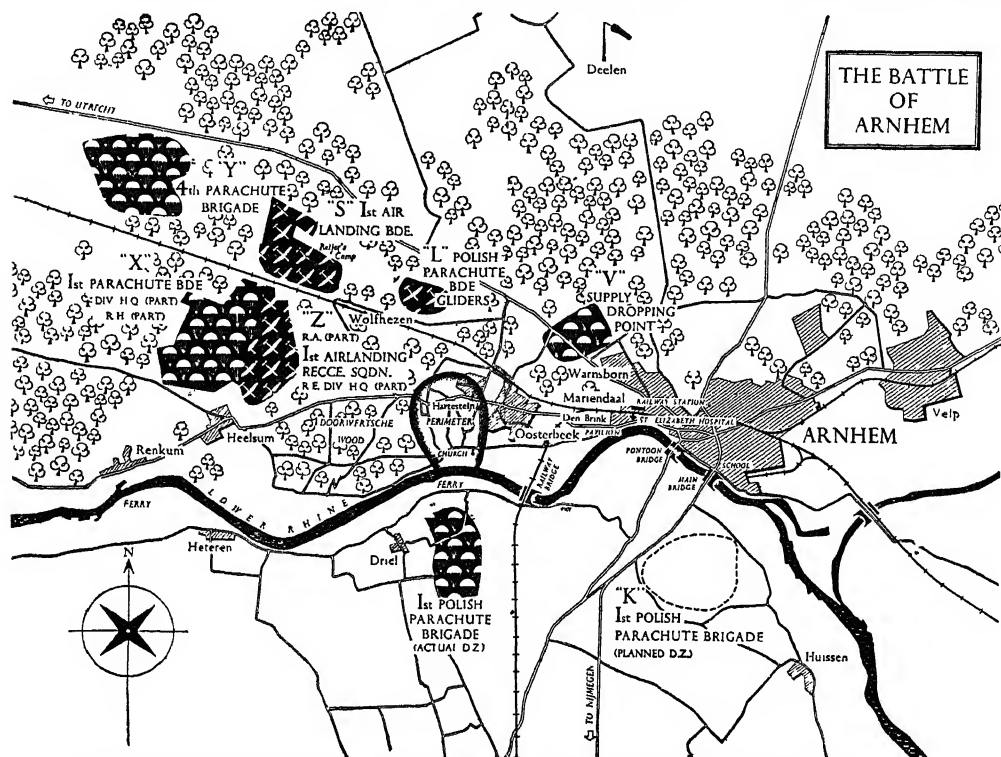
Of the British div., commanded by Maj.-Gen. Urquhart, the total number airborne has been officially stated as 10,095, including 1,126 glider pilots. As it was not possible to take them all in one lift, the commander decided to put down about two-thirds on the first day and the remainder in the morning of the next. The intention was that by the end of the second day there should be a defensive perimeter embracing Arnhem, and a reserve of airborne troops at the south end of the bridge.

The first lift took off from England in the forenoon of Sunday, Sept. 17, and the drops and landings N.W. of Arnhem were almost completely successful. But after that, things went awry for the attack. The Germans reacted at once and strongly, and soon there were armoured cars and tanks and guns, including 88-mm. and self-propelled guns, mortars and flame-throwers, as well as the usual infantry weapons, in action against the less heavily armed British troops.

The parachute brigade moving towards the bridge sorely missed, in the confused struggle that developed, the help they might have had from the glider-borne battalions, whose necessary first duty was to stand guard over the landing zones till the second lift arrived. That second lift next day



Arnhem. Three British paratroopers bombard German positions with a 3-in. mortar
Photo. British Official



Arnhem. Plan showing the dropping and landing zones chosen for the airborne operations round Arnhem

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came several hours late, its start having been delayed by bad weather. One parachute battalion reached the bridge, and held it for nearly four days, but in conditions which hourly became more desperate. The rate of casualties in the division generally was such that the planned perimeter could not be established, and this failure led to a tragically fruitless display of heroism by the R.A.F. A dropping zone for supplies by air had been fixed beforehand, but was never in fact controlled by the British. Nor did the R.A.F. receive signals sent asking them to drop their loads in another area. Pilots, therefore, believing they were giving vital aid to their comrades, flew their machines in succession into extremely heavy A.A. fire only to let the supplies fall among the enemy.

The groups into which the division was split just fought on, with no chance to sleep, their food and ammunition running out, and little more than their own indomitable spirit to keep them at their single task now of killing Germans. They fell back into a shrinking perimeter west of Oosterbeek. From there most of the survivors withdrew across the

river in assault boats during the night of Sept. 25-26. They left behind them 7,605 killed, wounded, and missing, including the medical staffs who chose to stay.

Attempts had been made to reinforce them across the river: very gallant and partly successful, but too small in scale to be effective. An early one was made by about 250 Polish parachutists who had dropped S. of the bridge. Later, about the same number of the Dorsetshires from the 43rd Wessex div. ran the gauntlet up from Nijmegen in trucks and amphibious "ducks" with stores and ammunition, and after great effort and loss got over in some force in boats. Meanwhile, the Guards' armoured units leading the 2nd army strove furiously to reach Arnhem but could not, because their only approach was a causeway running largely above flat fields on soft ground. No tank could leave the road and not be bogged; yet those on it were sitting targets for German gunners on high ground overlooking it. The road was constantly swept by fire and cut by enemy battle groups with tanks, and to keep up supplies was impossible.

The achievement of the men of Arnhem was in forcing the enemy to use all his available troops and resources there, which they destroyed or otherwise prevented from moving by the shortest route to reinforce the Germans opposing the Allied troops at the great bridge of Nijmegen. Their battle and sacrifice helped more than they knew in the success of the U.S. airborne divisions at Nijmegen and Grave, whom the Guards were able to support quickly. The operation as a whole stopped the enemy from fortifying two of the three river lines, and enabled the 2nd army to jump over 50 m. towards the German frontier and lodge itself in what the Germans had imagined would be their own winter positions.

Arnhem Land (OR ARNHEIM). District in the Northern Territory, Australia. It lies between the Gulf of Carpentaria and Anson Bay, and is the extreme N. portion of the territory. It was named after the ship of the Dutch navigator who discovered it in 1618.

Arnica. Dried root or flowers of *Arnica montana*, a plant which grows in middle and southern

Europe. Tincture of arnica is a popular application for the relief of bruises and sprains.

Arnim, ELISABETH OR BETTINA VON (1785-1859). German writer. Born at Frankfort-on-Main, April

4, 1785, daughter of the Maximiliane who had been beloved by Goethe when young, and a sister of the romantic writer Clemens Brentano, she first met



Elisabeth von Arnim, German writer

Goethe in 1807, and fell violently in love with him. But her passion was not returned, and in 1811 Goethe broke off the friendship owing to Bettina's rudeness to his wife. In the same year she married Ludwig von Arnim, the poet and novelist. Her famous Correspondence of Goethe with a Child, 1835, though founded on fact, contains much fiction. She died in Berlin, Jan. 20, 1859.

Arnim, ELIZABETH MARY, COUNTESS VON. This British novelist, author of Elizabeth and her German Garden, is noticed in full under Russell, Mary.

Arnim, HANS GEORG VON (1581-1641). German soldier. Born in Brandenburg, after serving with the Swedes, 1613, and later with the Poles, he became a field-marshal under Wallenstein in the Thirty Years' War. He afterwards went over to the other side, held a command under Gustavus Adolphus at Breitenfeld, 1631, and acted as intermediary in the negotiations between John George, elector of Saxony, and Wallenstein, 1634. Accused of plotting against Sweden in 1637, he was taken to Stockholm as a prisoner, but escaped to Hamburg in 1638. His last years were spent in fighting for the Germans against the French and Swedes.

Arnim, JURGEN SIXT VON (b. 1889). German soldier. He was born at Erndorf, Silesia, April 4, 1889, and entered the army at an early age. In the First Great War he served with distinction, and after Germany's defeat in 1918 he was one of the few officers to retain a high position in his country's skeleton army. A typical Prussian militarist, he showed outstanding ability, and became one of Germany's leading anti-tank specialists. In the Second Great War his technical knowledge was used to advantage in the North Africa campaigns, and it was he who was responsible for construct-

ing the Alamein defences during the crucial stage of the desert fighting in 1942. Appointed c.-in-c. of Axis forces landed in Tunisia 1942-43, he successfully held up the Allied advance on Tunis. As Rommel had left Africa before his retreating forces joined von Arnim's on April 13 (*see* Tunisia, Battle of), von Arnim then assumed command of all Axis troops in Africa until his final defeat a month later. He and his quarter-million men made no attempt at a "Dunkirk." He himself surrendered May 12 near Enfidaville to the c.o. of the 2nd Gurkhas, and reached England as a prisoner of war four days later. He was released after the end of the war and sent to Germany.

Arno. A river of Italy. The ancient Arnus, it rises on Monte Falterona, in the Apennines, flows swiftly S. nearly to Arezzo, curves N.W. and then W., passing through Florence, to the Mediterranean 7½ m. below Pisa. Often in flood, it brings down much alluvium, which has caused the sea to recede some 5 m. within the past 2,000 years. It is 150 m. long and navigable by barge to Florence.

During the summer of 1944 the Arno and its valley were the scene of fierce fighting as the Germans retreated slowly up the peninsula, stubbornly contesting every strong-point. The Allied 8th army took Arezzo on July 16, pushing on next day to cross the Arno at two points. They advanced up the valley, while American troops of the 5th army fought their way to reach the Arno canal near Leghorn (July 21). Though Allied formations were at the outskirts of Florence by Aug. 4, the city was not liberated until the 22nd. Meanwhile, on Aug. 10, Allied troops reached the Arno from Montelupo to a point 3 miles E. of Florence. Early in Sept. the 5th army crossed the Arno, and a general Allied advance began towards the Gothic Line (*q.v.*).

Arno, PETER (b. 1902). American cartoonist. He was born on Jan. 8, 1902, and was educated at Yale university. He became subsequently well known for his satirical drawings which appeared in the New Yorker, Ballyhoo, and other American magazines. His cartoons, which satirised the foibles of the day, re-

vealed a sophisticated sense of humour, and exhibitions of his work in New York, Paris, and London made him internationally famous. Many of Arno's drawings were collected into volumes; the best known were Parade, 1931; Circus, 1933; For Members Only, 1937; Cartoon Review, 1943; The Man in the Shower, 1945.

Arnold. Urban district and market town of Nottinghamshire, England. It is 4 m. N.E. of Nottingham and has lace and hosiery factories. The church of S. Mary, partly Norman but chiefly Early English, is supposed to have been built in the 12th century; it has a 15th century tower, and was partly restored in 1868 and 1877. Market day, Sat. Pop. 14,470.

Arnold of BRESCIA (c. 1100-55). Italian monk and reformer. Of noble descent, he studied at Paris, possibly under Abélard (*q.v.*). Becoming a canon regular, on his return to Italy he attacked the clergy for holding property and, banished by Pope Innocent, went back to France. He was condemned by the Council of Sens, 1140, on the instigation of S. Bernard, for holding the opinions of Abélard, and retired to Zurich. Thence, in 1143, he proceeded to Rome, where a republic had been set up, and at once attacked the papacy, the episcopate, and the monastic orders for their temporal possessions. On the accession of Pope Adrian IV in 1154 Rome was threatened with an interdict, and Arnold fled to the Campagna. He was brought back to Rome, June, 1155, and hanged.

Arnold, SIDNEY ARNOLD, 1ST BARON (1878-1945). English politician. Son of a Manchester stockbroker, he was born Jan. 13, 1878, and educated at Manchester grammar school. For many years he was a member of the Manchester stock exchange. Liberal M.P. for Holmfirth, West Riding, 1912-21, he joined the Labour party in 1922, and in 1924 was made a peer on his appointment as under-secretary for the Colonies in the MacDonald administration. Paymaster-general in the second Labour govt., he resigned from the party in 1938 owing to his disagreement with its policy of resisting the fascist dictatorships by going, if necessary, to war. He died Aug. 3, 1945, leaving no heir.

Arnold, BENEDICT (1741-1801). American general. Born at Norwich, Connecticut, Jan. 14, 1741, he joined the American army in the War of Independence, fought at Ticonderoga and Quebec, and



Peter Arno, American cartoonist

reached the rank of major-general. In 1777 he was greatly aggrieved by the promotion of five inferiors over his head. He fought, however, at Ridgefield and Saratoga, and was commander of Philadelphia, 1778, and later of West Point, 1780. He then entered into negotiations with the British, through John André, for the betrayal of West Point. André was taken and hanged, but Arnold made his way to the British lines, received a command in the British army, and fought against the Americans. He sailed for England in 1782, and died in London, June 14, 1801.

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Arnold, Sir Edwin (1832-1904). British poet and journalist. Born at Gravesend, June 10, 1832, he was educated at King's College, London, and University College, Oxford. After spending five years in India as principal of the Government College at Poona, he joined the staff of *The Daily Telegraph* in 1861, and was connected with that journal for the rest of his life. His reputation as a poet rests on *The Light of Asia*, 1879, an epic dealing in florid blank verse with the life of Buddha. Although it failed to commend itself to the best critics, it enjoyed great vogue. *Seas and Lands*, 1891, is a record of travel. He died March 24, 1904.

Arnold, Matthew (1822-88). British poet, critic, and educationist. He was born at Laleham-on-Thames, Dec. 24, 1822, eldest son of Thomas Arnold of Rugby, and educated at Winchester, Rugby, and Balliol College, Oxford. He was Newdigate prizeman in 1843, became fellow of Oriel 1845, and from 1847 to 1851 was private secretary to Lord Lansdowne, president of the council, by whom in 1851 he was appointed inspector of schools. He held this post for over 30 years, retiring in 1883, and from 1857 to 1867 was professor of poetry at Oxford. In 1883 and 1886 he lectured in America. He died suddenly at Liverpool, April 15, 1888, and was buried at Laleham-on-Thames.

As school inspector Arnold left valuable reports on the educational systems of France, Germany,

and Holland, 1861-5. His Oxford lectures *On Translating Homer*, 1861-2, advocated the English hexameter as an equivalent for the Homeric rhythm. His lectures *On the Study of Celtic Literature*, 1867, gave marked impetus to the subject, while his *Essays in Criticism*, 1865-88, ensured his position as a critic. *Culture and Anarchy*, 1869, *S. Paul and Protestantism*, 1870, *Literature and Dogma*, 1873, *God and the Bible*, 1875, and *Last Essays on Church and Religion*, 1877, raised discussions in all sections of church life. Not Christianity, but the common conception of it, was the subject of his criticism. He edited selections from Johnson, Byron, Wordsworth, and Burke.

Arnold's first Poems, including *The Strayed Reveller*, 1849, and the volume with *Empedocles on Etna*, 1852, were anonymous. His next volume of poems was issued in 1853 under his own name, with a preface that heralded his fame as a critic. His more noteworthy poems, in addition to the two already mentioned, are *Thyrsis*, a monody on his friend Clough and one of the outstanding elegies in the language; *Sohrab and Rustum*, *Mycerinus*, *Tristram and Iseult*,

The Forsaken Merman, *Rugby Chapel*, *Requiescat*, *The Scholar Gipsy*, *Stanzas From the Grand Chartreuse*, *Westminster Abbey*, *Heine's Grave*, and some beautiful sonnets, including one on *Shakespeare*. His *Merope* is a play after the Greek manner.

Influenced by Wordsworth, Clough, Goethe, and Senancour, Arnold consistently opposed Victorian smugness and what he called philistinism; he pleaded for classic ideals, restraint, a standard of mind instead of material comfort. He regarded France as superior to Britain in mentality and Germany as Britain's superior in practical affairs. His prose, often beautiful, as in the preface to *Essays in Criticism*, sometimes bantering, as in *Friendship's Garland*, 1871, is consistently dignified, calm, lucid, and felicitous. His poetry, usually meditative, is classic in form and spirit; by it his name will be best remembered.

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THOMAS ARNOLD: EDUCATIONIST

Sir Michael Sadler, Master of University Coll., Oxford, 1923-34

The life and work of the re-founder, as he may be called, of the public school system of England is here outlined. See also Education; School; University; William of Wykeham; and the separate articles on the great public schools

Thomas Arnold was born June 13, 1795, at Cowes, Isle of Wight. He was educated at Winchester and at Winchester (1807-11), whence he went to Corpus Christi College, Oxford, where he came under the influence of the writings of S. T. Coleridge and Wordsworth. He was elected fellow of Oriel College in 1815 and was ordained in 1818. He married Mary Penrose in 1820 and lived at Laleham-on-Thames between 1819 and 1828, taking private pupils.

Headmaster of Rugby

In 1828 he was elected headmaster of Rugby school, at a time when public opinion was largely adverse to public school education, which had remained too impervious to the new religious and social ideals of the age. Chosen professor of modern history at Oxford in 1841, he held this office with his headmastership. He died suddenly at Rugby, June 12, 1842.

Arnold's written works were mainly religious and historical, but he also published in numerous periodicals articles on social and educational questions. He wrote

A History of Rome, 1838-43, and *A History of the Later Roman Commonwealth*, 1845. He also edited *Thucydides*. A six volume edition of his *Sermons*. rev. Mrs. W. E. Forster, appeared in 1878.

Arnold's Educational Ideals

Arnold defined the aim of education as a union of moral and intellectual excellence. Education must, therefore, in his view have a religious basis; and upon a foundation of liberal culture must prepare for subsequent professional and civic duties, but without premature specialisation. Education in a public school was better for most boys than private tuition. The moral dangers of school life were aggravated in boarding schools, which, however, as a historic and characteristic part of English higher education, should be preserved on account of the value of their traditions, but needed a new moral impulse and internal reform. In such reform the personality of the teacher would be the prime force.

Next in importance to the personality of the teacher was a good



Matthew Arnold
Painting by G. F. Watts

moral tone in the school community, the social influence of which was valuable in the formation of character. Such a tone might be promoted by skilful organization of school life; by the careful selection of pupils and the withdrawal of those whose influence was unsuitable; by entrusting responsibilities in self-government to the different categories of boys, graded according to age and standing; by personal guidance from the masters; and by a wise system of rewards and punishments. The other necessary factors in a good education were a well-planned curriculum, aiming at the creation of a desire for knowledge and at the imparting of a right point of view, and the use of methods of instruction which stimulated mental activity, trained the power of self-expression, and adjusted themselves to the individual needs of different temperaments and types of mind. A national system of education should consist of grades of schools, according to the main social groups in the national life. But this grading, which, in his view, should be in three layers, was hurtful if class prejudice impaired the sense of mutual obligation to the collective interests and life of the nation.

Arnold won over to the support of the public school system the new upper middle class which, especially in the north of England, had become wealthy through industrial and commercial prosperity. His success at Rugby led to the establishment of a number of new boarding schools on the model of the older public schools. He was instrumental in raising the age of entrance to the public schools, in encouraging the growth of preparatory schools, and in deferring the age of entrance to the older universities. He broadened the idea of classical education and, by the general direction of his influence rather than by actual precept, gave new prestige to history, English literature, and mathemat-

ics in the public school curriculum. His influence strengthened the school of thought which inclines to undenominational Christian teaching as the basis upon which religious instruction may be retained in schools attended by pupils drawn from a variety of religious bodies. He won for the headmasters of the public schools greater freedom from interference on the part of governing bodies, and in some degree



Thomas Arnold, English educational reformer

Bust by Boehm in Temple Speech Room, Rugby

vindicated the political independence of the teaching profession.

Arnold increased the prestige of the great endowed schools and strengthened their position against any intrusive form of control by the state. Unintentionally on his part, his success retarded the effective reorganization of English secondary education upon a local basis, as he made it customary, in circles in which another practice had been usual, for boys to be sent away from home to distant schools. His single-handedness in the moral reform of the public schools was inadvertently exaggerated by Stanley, in ignorance

of the full facts of the case, and the effects of Arnold's personal influence upon the mind and outlook of a sensitive boy were seriously questioned by many competent observers; but, when all is said, Arnold stands out as the most heroic figure in English secondary education in modern times.

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Arnold-Forster, HUGH OAKLEY (1855-1909). British politician. Born at Dawlish, Devon, Aug. 19, 1855, he was the grandson of Thomas Arnold. Left an orphan in 1859, he was adopted by W. E. Forster (*q.v.*), his uncle by marriage. He joined the publishing firm of Cassell and wrote several school text-books. Lib. Unionist M.P. for W. Belfast, 1892-1906, and Unionist M.P. for Croydon, 1906-9, he was secretary to the Admiralty, 1900-3, and secretary for war, 1903-6. He died in London, March 12, 1909.

Arnoldi, WILHELM (1798-1864). German prelate. Born at Baden, he studied at Trèves, and having been ordained, was attached to the cathedral there. In 1839 he was chosen bishop, but not until 1842 did the authorities allow him to take up his office.

Arnoldson, KLAS PONTUS (1844-1916). Swedish pacifist. Born at Göteborg, Oct. 27, 1844, he was largely self-educated, and became a worker on the state railways. By 1882 he had secured a reputation as a writer on rationalist philosophy and was elected to the Riksdag, where he became an advocate of the permanent neutrality of the Scandinavian countries, religious tolerance, and the rights of women. He founded the Swedish Society for Peace and Arbitration and was awarded the Nobel Peace Prize in 1908, devoting the money to the cause of peace. He died at Stockholm, Feb. 20, 1916.

Arnould, MADELEINE SOPHIE (1744-1802). French singer. Born in Paris, she first appeared in public at the Grand Opera House,



Sophie Arnould, French beauty and wit, who was a popular opera singer
J. B. Greuze, Wallace Collection



Thomas Arnold. The old schoolhouse at Rugby

Paris, Dec. 15, 1757, and until her retirement, in 1778, was one of the most popular opera singers. She was the first to play the title-part in Gluck's *Iphigeneia in Aulis*. A beauty and a wit, her salon was the resort of distinguished writers. Many of her witty sayings are preserved in the collection known as *Arnouldiana*.

Arnsberg. Town of Germany, in the former prov. of Westphalia, on the river Ruhr, 44 m. S.E. of Münster. It was the capital of the district, had breweries and distilleries, and manufactured paper and railway materials. In the 13th century it had a Benedictine abbey and a castle, ruins of which still remain. After being for over 400 years part of the electorate of Cologne, Arnsberg passed to Hesse in 1802 and to Prussia in 1815. Pop. pre-war, 11,791.

Arnstadt. Town of Germany, in Schwarzburg-Sondershausen. It is pleasantly situated on the Gera, 12 m. S. of Erfurt, and is one of the oldest towns of the district. It has a fine 12th century church, the remains of a castle, a 16th century town hall, and a school founded as a Latin school in the Middle Ages. It manufactured beer, gloves, and porcelain. Overrun by U.S. forces in April, 1945, it lay in the Russian zone of occupation after Germany's surrender. Pop. pre-war, 21,693.

Aroa. Town of Venezuela, in Yaracuy province. It stands on the river Aroa, 50 m. by rly. S.W. of Tucacas, and is a copper-mining centre. The river flows for about 100 m., generally E. by N., to the Gulf of Triste.

Arolla. Village and mt. resort of Switzerland, in the canton of Valais. Near the Arolla Glacier, at the head of the S.W. branch of the Val d'Herens, it is four hours by mule-path from Evolena. Its alt. is 6,570 ft.

Aromatic Compounds. Group of organic chemical substances which includes the benzene (C_6H_6) derivatives. Kekulé in 1865 was the first to adopt the term "aromatic," because the members of the group possessed pleasant odours. The group has since been enlarged to include substances analogous in chemical behaviour, but without pleasant odour. The greatest source of aromatic compounds is coal tar. The benzene derivatives have a nucleus of six carbon atoms and a characteristic stability. Nitro compounds and sulphuric acid derivatives are formed by direct

action of nitric acid and sulphuric acid respectively. The other great group of organic substances is the aliphatic or fatty compounds, these being looked upon as derivatives of methane (CH_4). Aliphatic compounds are distinguished by containing open carbon chains in contrast to the closed chains or rings of the aromatic series.

Aroostook. River of North America. It rises in Maine, and flows 140 m. N.E. to the St. John river, New Brunswick, Canada. It was concerned in the long N.E. boundary dispute between the U.S.A. and Great Britain, settled in 1842 by the Ashburton Treaty. It gives its name to a co. of Maine.

Aros. Negro tribe dwelling W. of the Cross river in S. Nigeria. Their funeral customs suggest early Egyptian influence. Human sacrifice at the bidding of a powerful juju deity and domestic slavery were practised until the tribe, the most intelligent and vigorous of the Ibo race, submitted to British control in 1902.

Arosa. A summer and winter resort of Switzerland, in canton Grisons. It is 19 m. by rly. E. of Coir, in the Schanfigg valley. Surrounded by pine-woods, it is 5,900 ft. high and is a favourite resort for consumptives.

Arpad OR ARPHAD. A city of Syria, N.W. of Aleppo (2 Kings 18 and 19; Isaiah 10, 36, 37; Jer. 49). The modern Tell Erfud, the original city was destroyed by Tiglath-pileser III about 740 B.C.

Arpad OR ANDREW (d. 907). Founder of the Magyar monarchy. Little is known of him beyond his appearance with his hordes in 896 and his conquest of the country afterwards named Hungary about 906. On his death his son succeeded him as duke of Hungary, and the Arpad dynasty lasted until 1301. Arpad's Monument, overlooking Brasso, was erected in 1896 to commemorate the 1,000th anniversary of the founding of Hungary.

Arpent OR ARPINE. French land measure, corresponding approximately to the English acre. There were various forms, e.g. the royal, common, and Paris arpent. It is still used in Louisiana, U.S.A., and in the French districts of Canada. The word appears in Domesday as *arpendus* and comes from *arepennis*, the Latinised form of a Gallic term used in measuring.

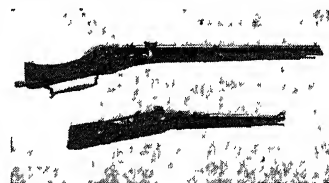
Arpino. Town of Italy, in Naples province. Situated at an alt. of 1,475 ft., midway between Rome and Naples it is 88 m.

by rly. S.E. of Rome. An old Volscian city, the ancient Arpinum, it retains much of its walls, gateways, and round towers. Near were born Vipsanius Agrippa, Marius, and Cicero. It manufactures parchment and leather, and has marble quarries. Wide damage and loss of life were caused by an earthquake in Jan., 1915.

The town was captured from the German occupying force by New Zealand troops of the 8th army on May 30, 1944. Well-known landmarks escaped damage, though one section of the Cyclopean wall was hit. The contents of the museum were saved with the exception of the coin collection, which the Germans looted.

Arqua Petrarca. A village of Italy, in Padua province. It lies among the Euganean Hills, 3 m. N.E. of Este. Here Petrarch lived his last four years, hence the name. His house remains and his tomb of red marble stands in front of the church. Near, on the Lago della Costa, are remains of a lacustrine village.

Arquebus OR HARQUEBUS. An early form of firearm. It appeared in the 15th century soon



Arquebus. The lower one is an early form, with a brass barrel in a wooden stock. The upper (time of Henry VIII) has the recess for bullets in the side of the stock shown open

after the discovery of gunpowder, and varied in size from a cannon to a musket. It was carried by the soldiers, but in the field was supported on a rest. The name itself is probably derived from two German words meaning a hook gun, the hook being made to fasten the weapon to its carriage or rest. The original form was known as the *arquebus à croc*.

The earliest arquebus was merely a small cannon fired by matchcord or tinder; but a 16th century Italian, Filippo Strozzi, made great improvements, and in his time it was effective up to 400 paces. It was the chief infantry weapon in the battles of the earlier part of the 16th century, Pavia for instance, but in the 17th was supplanted by the musket. Arquebuses of calibre, i.e. with a uniform bore, became the calivers of the English army. In the time of

Elizabeth, when the Spaniards were threatening England, a corps of arquebusiers was formed. See Artillery; Musket.

Arquerite. Native amalgam of silver. It is found in the mines of Arqueros (whence the name), in the prov. of Coquimbo, Chile, and is a source of silver. Its composition is said to be silver 86.63 p.c. and mercury 13.37 p.c. See Silver.

Arracacia esculenta. Perennial herb of the order Umbelliferae. It has a tuberous root con-



Arracacia esculenta, showing below barren flower, fertile flower, and fruit

sisting of several carrot-like lobes. The plant is not unlike the common hemlock (*Conium maculatum*), to which it is related botanically. It is cultivated as a food plant in the mountainous parts of northern S. America, and the boiled tubers are considered to have a flavour which suggests both parsnip and sweet chestnut.

Arrack or **RAKI** (Arab. *araq*, juice). Name of any locally made spirituous liquor in the E. Indies, especially that distilled from palm toddy, from rice or molasses fermented with palm-juice, or from flowers of the mahwa tree. Usually imperfectly prepared, it is an inferior but potent, injurious spirit, containing from about 53 to 75 p.c. of alcohol.

Arrah. Principality of Bihar province, India, capital of Shahabad district. It is 33 m. by rly. W. of Patna, and connected by canal with the Ganges. In 1857 twelve British with only fifty Sikhs held here two buildings for eight days against 2,000 sepoys and several thousand armed natives, until relieved by Eyre. Pop. 40,769.

Arraignment (late Lat. *arra-tionare*, to call to account). English legal term. It means bringing a prisoner who has been indicted, or found guilty on a coroner's inquisition, before the court which is to try him. The accused must be brought to the bar of the court, or placed in the dock. The charge is read or explained to him by the clerk, and he is asked to plead guilty or not guilty. A prisoner is not allowed to be arraigned in fetters, unless on apprehension of violence or attempted escape. Where the indictment also charges the prisoner with having been previously convicted of felony, this must not be mentioned on the arraignment, for fear of prejudicing the prisoner on his trial for his present offence. See Trial.

Arran. Largest island in the Firth of Clyde, Scotland. It forms part of Buteshire, is 20 m. long, from 8 m. to 11 m. broad, and has an area of 165 sq. m. The N. and N.W. are rugged and picturesque, intersected by narrow glens of great beauty, with many conical mts., the highest being Goat Fell, 2,866 ft. Farther S. the land is less elevated, undulating, and largely under cultivation. Of several good bays, Lamlash, on the S.E., is one of the finest natural harbours in the British Isles. Others are Brodick Bay and Whiting Bay on the E., and Loch Ranza, N.W.

Next to agriculture, cattle and sheep rearing and fishing are the chief industries. Many of the coast villages are favoured as holiday resorts. The castle of Brodick, the chief village, was long a seat of the dukes of Hamilton, to whom most of the island belonged. On the death of the 12th duke in 1895 it passed to his daughter, the marchioness of Graham. Kildonan Castle is a ruin of the 14th century. Among other antiquities are the ruins of Loch Ranza Castle, stone circles, and monoliths. For many years occupied by Norse raiders, Arran was annexed to Scotland in 1266, and here Robert Bruce took refuge in 1306. Pop. 4,500.

Arran, EARL OF. Scottish title, held by several famous men, and now a secondary one of the duke of Hamilton; also an Irish title held since 1762 by the family of Gore.

In 1467 James III. of Scotland gave the title of earl of Arran to Thomas Boyd, and in 1503 it was revived for James Hamilton, a kinsman and friend of James IV. Until his death in 1529 this earl was prominent in all the troubles of the time, fighting both on land and sea against England, and more than once engaged in civil war and faction fights.

His son, the 2nd earl, figures largely in Scottish history during the reign of Mary. In 1542 he was declared protector of the kingdom and heir presumptive to the throne: he held the former position until 1554. After this followed exile in France, imprisonment alternating with authority in Scotland, and before his death on Jan. 22, 1575, a period of rebellion against James VI. By the French king Arran was made duke of Châtellerauld; he is the ancestor of the dukes of Abercorn.

His son James, the 3rd earl, was spoken of as a likely husband for either Mary of Scotland or Elizabeth of England. A Protestant leader, for a few years he was deprived of his title, which was held from 1581 to 1586 by James Stewart. From about 1568 until his death in 1609, Arran was wholly or partially insane. The title



Arran. Glen Sannox, from the bridge. The glen, remarkable for its Alpine-like grandeur, is 5 miles north of Brodick

descended to his nephew James, marquess of Hamilton, the father of the first duke of Hamilton.



James Hamilton, 2nd Earl of Arran. C. Ketel, Hamilton Coll. See Hamilton.

The Irish title earl of Arran, taken from the Aran or Arran Islands, was granted in 1762 to Arthur Gore, Viscount Sudley. His descendant, the 6th and present earl, sits in the House of Lords as Baron Sudley.

Arran. Variant spelling of the name of three islands in Galway Bay, better known as the Aran Islands (*q.v.*).

Arrangement. In music, the translation of a composition for voices or instruments other than those for which it was originally designed. Examples are pianoforte music arranged for organ or orchestra or military band; orchestral music translated for organ or pianoforte; songs transcribed and elaborated into pianoforte solos.

The practice has been sanctioned by many great composers, who have made, or commissioned others to make, transcriptions of their own works. Notable cases are Bach's concertos for harpsichord or violin, and his transcriptions of Vivaldi's concertos; Handel's frequent rewriting of airs, intended for one kind of voice, for another voice with new setting of the accompaniments; Liszt's, Grieg's, and Brahms's rearrangements of their own works, and Liszt's resetting of songs as pianoforte solos.

An important class of arrangements differing in intention from the above includes the transcriptions of orchestral overtures, symphonies, and works of similar calibre for pianoforte solo or duet. These arrangements are the equivalent of line engravings of pictures, and their educative value cannot be overestimated.

A more popular use of the term is met with the adaptation of music to suit the requirements of dance rhythm or the limitations of a dance orchestra. Arrangements are also made of new dance tunes of which the composer may be able to supply only the air. The arranger adds suitable harmonies. In films a musical arrangement is an adaptation recorded on the sound track of appropriate new or old music to synchronise and point the changing moods or scenes of the film.

Arras. Tapestry fabric woven in colours with figures and scenes, so called from the city of Arras, N. France. During the 14th and 15th centuries the tapestries of Arras were so famous that the name *arras* was used in England as the general term for tapestry wall-hangings. The *arras* was often hung a considerable distance from the wall, thus providing a lurking-place for eavesdroppers. Polonius, in Shakespeare's *Hamlet*, was stabbed while hiding behind the *arras*. See *Tapestry*.

Arras. City and episc. see of N. France. The capital of the depart-

ment of Pas-de-Calais, it stands on the river Scarpe, 38 m. by rly. N.E. of Amiens. Its 16th century town hall, which was a richly decorated building with a belfry 240 ft. high, and its cathedral, begun in 1755 to replace the old abbey church of S. Vaast, were laid in ruins during the First Great War, as were the tall gabled houses with arcades which surrounded the *Petite Place* and *Grande Place*. The public library had 40,000 volumes. Little survives of Vauban's fortifications. The city was rebuilt and largely restored during the years between the wars. Manufactures include hosiery, agricultural implements, pottery, and china. One of the busiest corn-markets in the country, Arras trades largely in locally grown beet, sugar, grain, and chicory. The making of tapestry, for which the city was once famous, is no longer carried on. The ancient *Nemetacum* or *Nemetocenna*, and the chief town of the *Atrebatas*, Arras, a corruption of a later form *Atrabate*, subsequently became the capital of the province of Artois. After being under the dominion of Burgundy, Flanders, and the Hapsburgs, it passed to France in 1659. In 1477, under Louis XI of France, it was peopled with Frenchmen and renamed *Franchise*. Robespierre was born here. Pop. 29,490.

FIRST GREAT WAR. At the junction of five rlys. only 50 m. from the Channel, Arras was of high strategic importance in the First Great War, and the Germans made a bold bid for its capture in Sept., 1914. German cavalry captured it on Sept. 1, the infantry arriving on Sept. 6; but they were unable to hold it. From Sept. 18, when French cavalry reached Arras, the city remained in Allied hands throughout the war, the British taking over the town early in 1916 as part of their extended zone of operations.

For long Arras was the northern pivot of the western battle line. The German lines were only 2 m. E. of the city, and at some points in the suburbs the rival trenches almost joined. There was fighting for possession of the city in Oct., 1914, when the Germans in a vain attempt to envelop Arras secured the dominating height of Vimy Ridge, 475 ft., to the N.E. On the S.W. slopes they built a tangle of trenches, concrete machine-gun posts, and underground galleries known as the Labyrinth. This was about 2½ m. long and just over 2 m. N. of Arras. In June and July, 1915, the French gradu-

ally cleared the labyrinth in severe hand-to-hand fighting. It was then, as the Germans fell back, that they constantly shelled Arras, reducing the cathedral to a wreck. But a threatening German salient had been flattened out as a result of this French attack.

Probably the most important of the five battles of Arras was the offensive launched by the British in the spring of 1917 in accordance with the general plan of campaign settled between the Allies (see *Aisne, Second Battle of*). Sir D. Haig hoped to transfer his offensive to Flanders later, to recover Ostend and Zeebrugge, and it was clear that the seizure of Vimy Ridge would insure him against any counter-offensive at Arras. The German positions there were now of enormous strength, heavily entrenched with cement and steel-armoured blockhouses, machine-gun posts, and belts of wire that were sometimes 100 yds. in depth. Before the attack new rlys. and roads had to be constructed, and to facilitate a secret concentration of troops and supplies in Arras itself a vast system of underground shelters and tunnels was devised. Three divisions, totalling some 50,000 men, were assembled underground for the battle.

Canadians at Vimy

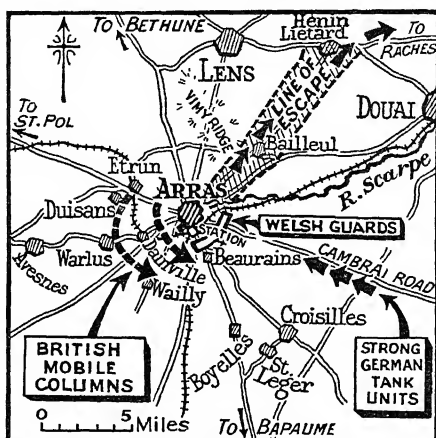
The attack opened on Easter Monday, April 9, on an 18-m. front. The total force employed was 28 divisions, *i.e.* about 450,000 men. They included 4 Canadian divisions. Within eight hours the whole of Vimy Ridge was cleared as far N. as Hill 145, where the German defence works were most formidable. Squalls of sleet and snow then intervened to hamper the movement of guns, but on the following day the Canadians cleared the last part of the Ridge, which the German garrison had been ordered to hold to the death because of its vital importance. Total British captures during the battle: prisoners, 19,500; guns, 257 (98 heavy); machine-guns, 404. The front was advanced 5 m., and Arras, from being one of the weakest points of the Allied line, became one of the strongest. British losses were 146,000 killed, wounded, and missing. German losses could not have been lighter.

In March, 1918, the Germans intended a break-through of the Allied line at Arras. They began by thrusting against the flank, but the British fell back in order after inflicting some losses. Ludendorff therefore opened a direct assault

on Arras and the heights commanding it. This opened March 28, after a bombardment of extreme violence. The Germans advanced in six lines almost shoulder to shoulder N. of the Scarpe and broke through the British outpost line, but their progress was stopped by the determination of infantry and machine-gun men and by the efforts of the artillery. During the night the British line was withdrawn some miles and all subsequent attempts to penetrate it were foiled. The battle exhausted at least 15

German divisions. They displayed the utmost courage, but their tactics were generally condemned as unsound by British commanders and later by their own staff.

The final battle of Arras opened Aug. 26, 1918, when the British 1st army was set to capture the Drocourt-Quéant line and the German rlys. running S.W. and S. from Douai. The British force employed was 10 divisions. The Germans had 13, supported by works of such extraordinary strength as to be reputedly impregnable. By the end of Aug. severe fighting had brought the British in front of the Drocourt line. On Sept. 2 the Canadian corps, supported by 40 tanks, with armoured cars, swept into the trenches, tunnels, and dug-outs of the German defence and completely shattered all resistance. The British burst into a triangle of works where the Hindenburg line joined the Drocourt line at



Arras, France. British line of retreat from Arras, 1940, when German superiority in numbers made withdrawal imperative

By courtesy of "The Daily Telegraph"

Quéant. The whole section of Scarpe to Quéant was in British hands by noon the same day, the defending troops being mostly killed or captured. Germany kept silence about this defeat.

SECOND GREAT WAR. From Oct., 1939, to May, 1940, the rear H.Q. of the British Expeditionary Force (g.v.) was at Habareq, 8 m. from Arras, and the garrison H.Q. was at the Palais S. Vaast. Thus the city was a nerve centre of the B.E.F. throughout the winter lull. As the German offensive of May, 1940, was developing, the British troops there, chiefly Welsh Guards, commanded by Maj.-Gen. R. L. Petre, faced heavy German onslaughts from May 18 to May 24. Violent fighting raged in the district as the Germans widened the breach between the Franco-British armies in N. France and the Allied forces in W. Belgium. The garrison H.Q. was desperately defended by British troops: but

by the end of May the Germans were driving through the "Arras gap" and British and French forces were falling back rapidly towards the Channel ports.

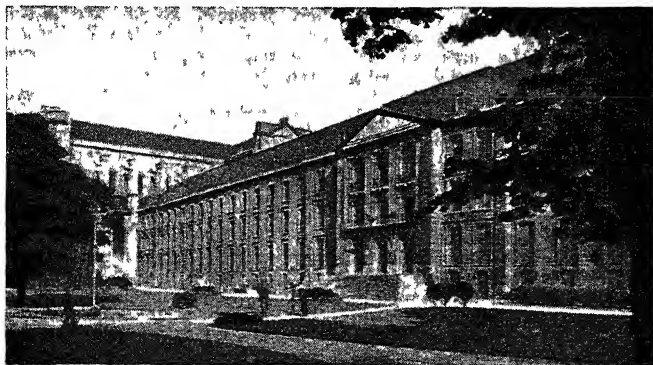
As a city of German-occupied France, 1940-44, Arras was repeatedly bombed by R.A.F. and U.S.A.A.F. planes, great damage being caused to rly. communications. The city was liberated by the British 2nd army, Sept. 1, 1944, during the great Allied drive through France.

Arras, TREATY OF. In 1414, during the Hundred Years' War between England and France, the peace between the Armagnacs and the Burgundians was signed at Arras. In 1435, also during the Hundred Years' War, a congress met at Arras with the object of making peace. Its main purpose was not achieved, for England refused to accept the French offer of Normandy and Guienne, but in Sept. the duke of Burgundy, hitherto the ally of England, came to terms with France. In 1482 Louis XI of France entered into an arrangement at Arras with the people of Flanders. See Hundred Years' War.

Arrastra. Machine used in Mexico and S. America for the fine grinding of the complex silver ores which occur in those regions. It is a very simple, often roughly built, but most efficient device. Its working parts consist of a vertical shaft fixed in the centre of a floor or bed about 12 ft. in diameter, so paved with stones (usually porphyry) as to leave no interstices. This shaft carries projecting from it two or four arms, at least one of which projects beyond the edge of the floor. From these arms depend stones, weighing from 100 lb. to 200 lb., resting on the paved floor. Mules are harnessed to the projecting arm, and the stones are dragged round on the floor, grinding the crushed ore to the required fineness. See Silver.

Arrebo, ANDERS CHRISTENSEN (1587-1637). Danish poet. He was born at Aeroskjøbing, and was bishop of Trondhjem 1618-22. His *Hexameron*, a poem in six books on the six days of creation, while modelled on Du Bartas's *La Semaine* (The Week), has striking elements of originality and power. Arrebo, who is sometimes styled the father of Danish poetry, made a metrical translation of the Psalms.

Arrest (Lat. *ad*, to; *restare*, to remain). In English law, when a person is compelled, by a restraint on his bodily liberty, to attend before a court of justice,



Arras. The Palais Saint Vaast, rebuilt after its destruction in the First Great War, was the British Garrison H.Q. in the operations of 1939-40

or to fulfil a legal obligation, he is said to be arrested. With few exceptions, there is now no arrest in England apart from criminal cases. A person accused of any crime may be arrested on a warrant under the hand and seal of a justice of the peace, before whom sworn information of the alleged crime has been laid. Judges of the High Court have also power to issue warrants.

It was established in the middle of the 18th century that a general warrant is void, i.e. the warrant must state the specific crime with which the person to be arrested is charged. The warrant may be entrusted to the police generally, or may be addressed to a named person—e.g. a soldier—who is not a constable.

Concerning arrest without warrant, it is lawful for anyone who sees a felony or breach of the peace committed to arrest the offender. A constable may arrest on reasonable suspicion of felony, or on reasonable grounds to prevent a felony or riot or other breach of the peace being committed, offenders who refuse name and address, and certain other classes of offenders. Arrest of a ship is a process of the Admiralty court, when a claim is made against the ship, whereby the ship (with cargo and freight if any) is placed under charge of the marshal of the court until trial of the action, or until it is released on the owner finding bail to answer the claim. See Warrant.

Arrestment. Process of the law of Scotland. By it the goods of a debtor are arrested in the hands of anyone who holds them, until the debtor has given his creditor caution or security to the value of the debt or claim in the value of the arrested goods. Arrestment *jurisdictionis fundandae causae* is where the goods of a foreigner, situated in Scotland, are arrested, in order to compel him to come into the Scottish courts. This process was used by Parnell when he brought an action for libel in Scotland against The Times. It is alluded to by Bailie Nicol Jarvie in Scott's Rob Roy.

Arrhenius, SVANTE AUGUST (1859–1927). Swedish chemist. He was born Feb. 19, 1859, at Schloss Wijk, near Upsala, and studied at Upsala, Stockholm, and elsewhere. In 1895 he became professor at Stockholm University.

Arrhenius made a special study of electrolysis, and suggested that electrolytic action is not confined to the chemical relations with which it had been hitherto chiefly associated, but may be found in

atmospheric phenomena. In a series of lectures delivered at California University he applied the methods of physical chemistry to the study of toxins and antitoxins. In *Worlds in the Making*, translated by H. Borns, 1908, he suggests that life is diffused in the form of spores, which may traverse space for ages until they are destroyed, as by the heat of an incandescent star, or find a place for development on some planet. He died Oct. 2, 1927.

Arria (d. A.D. 42). Noble Roman lady, wife of Caecina Paetus. When her husband was ordered to commit suicide and hesitated, Arria seized the dagger, drove it into her own breast, and handed it to him with the words "Paetus, it does not hurt."

Arriaga, MANOEL JOSÉ DE (1839–1917). The first president of the Portuguese republic. Born at Horta, in the Azores, he was educated at Coimbra University. After qualifying as a lawyer, he practised for many years with success at Lisbon. Early professing republican convictions, he was deputy for Funchal, 1882–4, and for Lisbon, 1890–2. He was elected first president of the Portuguese republic Aug. 24, 1911, on the retirement of the provisional president, Dr. Braga, and resigned May 28, 1915. He died March 5, 1917. He received a doctorate of laws from Coimbra University, and was noted as a lawyer, a poet, and a writer on politics and economics.

Arrianus, FLAVIUS, OR ARRIAN (c. A.D. 100–180). Greek historian. Born at Nicomedia in Bithynia, he lived for some time at Nicopolis in Epirus, where he studied under the Stoic Epictetus. In 124 the emperor Hadrian bestowed upon him the Roman citizenship. In 136, while prefect of Cappadocia, he signally defeated the Alani. Under Antoninus Pius, Arrianus was consul in 146; but four years later he retired to his native town and devoted his leisure to literary work. His chief works are the *Philosophical Lectures* of his master Epictetus in eight books, four of which are extant; the *Encheiridion* Epictetou, a handbook of the ethical philosophy of Epictetus, still extant; and the *Anabasis Alexandrou*, almost complete, a history of the campaigns of Alexander the Great, based on contemporary narratives.

Arris (Latin *arista*, fish-bone). Term used by builders and joiners for a raised edge or line formed by the juncture of any two sides of a wood or stone body, which together make an external angle. The raised edges that separate the

flutings in a Doric column are describable as arrises.

Arroba (Arab. *arrub'*, from *al*, the; *rub'*, fourth part). Spanish and Portuguese weight and measure. As a weight it is used in Mexico and Spanish America, being equivalent in Argentina, Mexico, and elsewhere to 25·30 lb. avoirdupois or thereabouts. In Brazil, where it was borrowed from Portugal, it is equivalent to 32·38 lb. As a liquid measure it is used in Spain, Portugal, and Spanish America.

Arrochar. Village of Dumbartonshire, Scotland. It stands at the head of the narrow Loch Long, and shares a railway station with Tarbet on Loch Lomond, 1½ m. E. It is a centre for rock-climbing on Ben Arthur. Pop. 670.

Arrol, SIR WILLIAM (1839–1913). British engineer. Born Feb. 13, 1839, in Renfrewshire, he was apprenticed as an engineer and in 1868 founded the firm of Wm. Arrol & Co. This firm was responsible for the reconstructed Tay Bridge (1882–87), Forth and Tower Bridges. Arrol was knighted in 1890, sat in parliament as Liberal Unionist for S. Ayrshire 1895–1906, and died Feb. 20, 1913.

Arromanches. Village of Calvados, France, 6 m. N.N.E. of Bayeux, with a small harbour and a 12th cent. church. Offshore is the Tête du Calvados, a great reef, on which many ships of the Armada were wrecked, 1588. At Arromanches, Mulberry (*q.v.*) harbour was built in 1944. Monuments commemorating the Allied landings here were erected on a strip of land near the beach given by the French govt. to the U.K. and the U.S.A. in 1946.

Arrondissement (Fr. *arrondir*, to make round). French term for a local government district. See France, p. 3511; Paris, p. 6341.

Arrow. Projectile fired from both the long bow and the cross-bow, referred to in the Bible as "artillery." In the Whitehall Museum, London, are some arrows used by the Crusaders in the

12th century. Made with a light, straight shaft of wood, they are fitted with feathers at the neck, the object being to steady the flight by imparting a rotary movement to the projectile, a principle



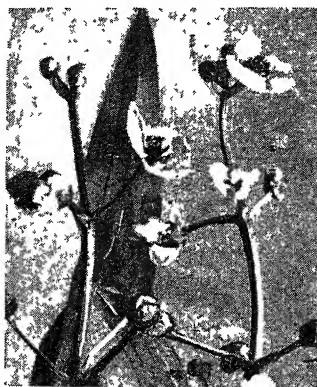
Arrises in a Doric column

adopted by the makers of modern firearms. The arrow-head was of hard wood, flint, iron, or steel, and often barbed, and some arrows had heads of ivory. Harold was slain by an arrow at Hastings in 1066, and the Chinese army used arrows in the war of 1860. Arrows were carried in a quiver sometimes elaborately ornamented. Poisoned arrows are still used by savages in fighting and hunting. *See* Archery.

Arrowhead (*Sagittaria sagittifolia*). Aquatic perennial herb, a native of Europe and N. Asia. It has large leaves shaped like an arrow-head, some floating, some erect above the water. The flowers are white, $\frac{1}{2}$ in. across, some with stamens only, others with pistils only. The plant hibernates in the form of small round tubers in the mud of ponds and ditches.

Arrow-head. Apex of a slender missile implement, especially when of material different from the shaft. Bone points and chipped flint heads, chisel-edged or leaf-shaped, attest the use in Palaeolithic Europe of primitive missiles hurled by hand, and afterwards by throwing-sticks. Used primarily in the chase, arrow-heads passed through leaf-shaped, lozenge-shaped and triangular forms to tanged, and ultimately to tanged and barbed flints, which were rarely polished. Employed during the early metal ages as weapons of war, they were displaced in some localities by copper, bronze, and iron forms. Chert and other hard stones were utilised, obsidian being characteristic of the Aegean, Japan, and Mexico. Stone arrow-heads are still made by some primitive peoples.

Arrow Incident. THE. Seizure of a ship, which led to war between Great Britain and China. On Oct. 8, 1856, the Arrow, a lorcha or ship rigged for service in Chinese



Arrowhead. Flowering shoots and arrow-shaped leaves

waters, was lying off Canton, when a mandarin came on board and arrested her crew as pirates. The justification was that, Canton being closed to foreigners, the Arrow could only enter by virtue of a permit, which had expired in the previous Sept. The captain of the Arrow was an Englishman, but her owner and part of her crew were Chinese, and the evidence as to whether or not she was flying the British flag was conflicting.

As the Chinese refused the demands of Britain for reparation, Canton was bombarded, and by way of reprisal British property was destroyed. On Dec. 28, 1857, China still refusing Britain's demands, Canton was again bombarded, and occupied. The treaty of Tientsin, June 26, 1858, ended the affair. *See* China: History.

Arrow Paradox. One of the arguments used by the Greek philosopher Zeno of Elea to prove the unreality of motion. An arrow in flight is really at rest, since at every moment it is only in one given place, and therefore can never reach its end.

Arrowrock Dam. U.S. irrigation dam, once the highest in the world. Completed 1915, it holds back the waters of the river Boise, Idaho, for the purpose of irrigating 200,000 acres of fertile land by means of about 1,000 miles of canals. The dam is 354 ft. high and 1,100 ft. across. A railway 17 m. in length was built to connect with the nearest railway at Barberton. Alfalfa, clover, cereals, and potatoes are the chief crops of the irrigated area.

Arrowroot (*Maranta arundinacea*). A perennial herb of the family *Marantaceae*. It is a native of tropical America, and is largely cultivated in the W. Indies. From its tuberous rootstocks a very pure starch is obtained by pulping in water, the sediment being washed and dried. Dissolved in boiling water it is converted into a fine jelly as a food for invalids. Other species of related plants are cultivated for the same purpose, while inferior or spurious arrowroot is obtained from the tubers of several plants of other orders, e.g. English arrowroot from the potato, and Portland arrowroot from the corms of the common cuckoo-pint. *See* illus., col. 1.

Arroyo Molinos. A village of Spain, in Estremadura. It lies 40 m. N.E. of Badajoz, and was the scene, Oct. 28, 1811, of Lord Hill's victory over the French.

Arru Islands. Variant spelling of the name of a group of islands in Indonesia, known also as Aru (*q.v.*) Islands.

Arsaces. The founder of the Parthian empire. A Scythian by birth, he induced the Parthians



Arsaces. Portrait on the obverse (left) of this tetradrachm, struck one century after his death
British Museum

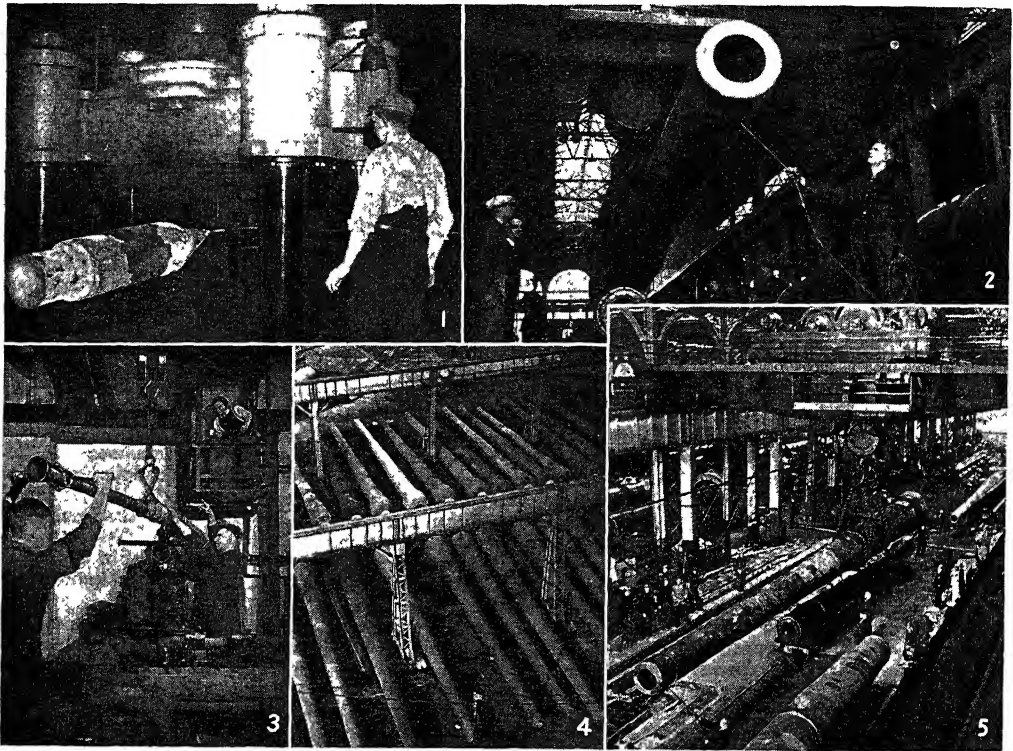
to revolt from the Seleucid Antiochus II about 250 B.C. Under his descendants the empire which he founded ultimately extended from Bactria to the Euphrates. Among his descendants, who were called Arsacidae, were Mithradates, Phraates, and Artabanus.

Arsamas or ARZAMAS. Town of Russia, in Gorky government. It stands at the union of the Techa and Arsha rivers, 75 m. by rly. S.S.W. of Gorky. It has several churches and is an active commercial centre, with tanneries, flour-mills, foundries, and oil. Its school of painting was formerly famous.

Arsenal (Arab. *dār assānā'ah*, from *dār*, house or place of; *al*, the; *sānā'ah*, mechanical industry). Establishment designed or utilised for the manufacture, repair, receipt, storage, and issue of arms, ammunition, and other stores employed in warfare by



Arrowroot. A plant of tropical America, from the tuberous roots of which is obtained starch food arrowroot



Arsenal. 1. Gun barrel being shaped in an hydraulic press. 2. Giant gun on lifting-gear. 3. A Bofors gun barrel is fitted to main assembly. 4. Naval guns ready for dispatch. 5. Travelling crane capable of lifting 130 tons

the military and naval forces of a country—the modern equivalent of the medieval armoury.

An arsenal should be capable of meeting all the demands made on it by the fighting forces for the supply and repair of *matériel*, but for some years, in the great countries at least, the requirements have been so varied and extensive that it has been necessary for the regular arsenals to be supplemented by the work of private firms undertaken on contract. In Great Britain the names of such firms as Vickers, Cammell Laird, Armstrong Whitworth, Beardmore, are household words in this connexion. The Royal arsenals, however, must be a nucleus of the whole system and are supplemented by the royal ordnance factories for the manufacture of guns, carriages, small arms, and ammunition.

The position of an arsenal is governed chiefly by strategic and partly by economic conditions. It must necessarily be thoroughly protected from attack and defended as strongly as a fortress, but it is inadvisable to place it in a fortified locality. It should be sufficiently near the scene of probable operations to minimise

supply difficulties, yet away from short-range air attack, and for the same reason at least partially underground. The principal British arsenal is now in North Wales, the famous Woolwich Arsenal and its huge war-time successor at Chorley (Lancs) now being used for breaking-down rather than manufacture. All came under the direction of the ministry of Supply during the Second Great War. For purely naval matters there are large depots attached to the principal dockyards, such as Portsmouth, Plymouth, and Chatham.

Arsenal. Name of an English football club founded in 1888 as Royal Arsenal Football Club, which name was changed in 1891 to Woolwich Arsenal, and in 1913 to Arsenal on transfer to Highbury. The ground and registered offices are at Arsenal Stadium, London, N.5. Under the management of Herbert Chapman (d. 1934) and George Allison, the club set out on a highly commercial policy of paying large sums for outstanding players with other clubs and building a team of "stars" to provide the best possible entertainment. Its rewards for this outlay were the winning of the Football

League championship in 1931, 1933, 1934, 1935, 1938, 1948; and the Football Association Cup in 1930 and 1936.

Arsenic (Gr. *arsenikon*, yellow orpiment). This elementary chemical substance (symbol, As) is classed as a semi-metal because, although it possesses the physical properties of a metal, such as lustre, and conducts electricity, it is incapable of forming a base with oxygen. The name arsenic properly belongs to the element, but in popular language the term "arsenic," sometimes distinguished as "white arsenic," is applied to arsenious oxide (As_2O_3).

Compounds of arsenic were known to the ancients. Aristotle refers to orpiment and realgar, and what Olympiodorus (5th century A.D.) terms "white alum" is, from the method of making, clearly white arsenic. Metallic arsenic is definitely mentioned by Albertus Magnus (d. 1280), and Geo. Brandt (1694–1768) showed the connexion between white arsenic and the metal.

Metallic arsenic occurs in the free state in nature at Zimeoff in Siberia, in Central Europe, Borneo, and New Haven in the

U.S.A. It occurs in combination in many ores and minerals.

Metallic arsenic is a steel-grey substance, which darkens on exposure to air, and when strongly heated gives off a lemon-yellow vapour and a garlic odour. It is generally prepared from native arsenic, or by heating arsenical iron in earthenware tubes. It is chiefly used as a constituent of alloys, e.g. with lead for producing hard shot. The two oxides of arsenic are arsenious oxide, known as "white arsenic" or "flowers of arsenic," and arsenic pentoxide (As_2O_5).

White arsenic is obtained as a by-product from the roasting of certain minerals associated with metallic ores. The Oxland and Hocking calciner, largely used in the United Kingdom, consists of a wrought-iron tube about 30 ft. long, and when lined with brickwork has an internal diameter of from 4 to 6 ft. The tube is set at an inclination which varies according to the kind of ore that is being worked, and is made to revolve once in from four to eight minutes. The ore, dried and crushed, is fed in at the upper end of the tube and the revolution of the cylinder exposes it to the action of the hot blast from the furnace at the lower end. The arsenic is volatilised by the heat and the spent ore passes out through an opening at the lower end of the tube. Many tons of ore are so dealt with every day.

Arsenic appears in commerce as a heavy white powder and also in a vitreous form known as arsenic glass, which is prepared by volatilisation under slight pressure. Arsenic is used in the aniline dye industry as a reducing agent: for fixing aniline blues in calico printing; in the manufacture of pigments, such as Scheele's green and Paris green; as a constituent of fireworks; as a weed-killer, rat-poison, fly-poison, and sheep-dip; in the manufacture of glass to remove colour caused by traces of iron; in the enamelling of metals; and in medicine as a febrifuge and an alterative.

Arsenic pentoxide is prepared from white arsenic by the action of oxidising agents such as nitric acid, and is used in the manufacture of rosaniline and in calico printing.

Arsenic forms with sulphur three different sulphides, of which realgar and orpiment are the chief. Realgar or arsenic disulphide (As_2S_2) occurs native. It is prepared artificially by heating together arsenic pyrites and sulphur pyrites, the sulphur being present in the finished product to the ex-

tent of about 25 p.c. Realgar is used in tanning and was formerly employed as a red pigment. Indian fire, used for signalling, is a mixture of 2 parts of realgar, 7 of sulphur, and 24 of nitre.

Orpiment or arsenic trisulphide (As_2S_3) is a lemon-yellow substance occurring in nature but usually made by subliming a mixture of two parts of white arsenic and one part of sulphur.

Arsenic combines with hydrogen to form arseniuretted hydrogen or arsine (AsH_3), a very poisonous gas which burns with a pale blue flame. Arsenic chloride (AsCl_3) or butter of arsenic is a very poisonous liquid giving off fumes. Arsenic bromide (AsBr_3) and arsenic iodide (AsI_3) are used to a small extent in medicine. Arsenic forms a number of compounds with organic radicals.

ARSENIC AS A POISON. Poisoning has occurred from the fine dust given off by wallpapers containing arsenical pigments; the burning of coke containing arsenic; accidental taking of sheep-dip, weed-killer, rat-paste, etc.; and the application of arsenical soaps and cosmetics to the skin.

Arsenic is placed in Part I of the Poisons List, so cannot be sold except under restrictions.

Arsenic, ORES OF. Arsenic is mainly obtained from arsenical pyrites, iron sulpharsenide. This ore usually occurs associated with quartz in veins and masses with the ores of lead, copper, and tin, generally in metamorphic schists and sometimes in serpentine. Of more limited importance are the sulphides, realgar and orpiment.

Arsenic and Old Lace. A comedy in three acts by Joseph Kesselring. One of the most successful comedies within modern times, this hilarious study of the nefarious practices of two eccentric maiden ladies was produced at the Fulton Theatre, New York, in Jan., 1941. On Dec. 23, 1942, it was produced at the Strand Theatre, London, where it ran for 1,396 performances; Lillian Braithwaite and Mary Jerrold played the chief parts. An American film was made in 1944.

Arsenides. Name given by chemists to primary combinations of arsenium with another element or an organic radical. The arsenides are analogous to the sulphides formed by sulphur, the chemical resemblance between the elements arsenium and sulphur being shown in this way. Metallic arsenides occur in nature, the arsenic being

combined with cobalt, nickel, or iron. These arsenides form important sources of arsenic. Zinc arsenide is made by heating zinc and arsenic together in a closed crucible. By decomposing the zinc arsenide thus formed with diluted sulphuric acid, the poisonous gas, hydrogen arsenide or arseniuretted hydrogen, is obtained.

Arsenopyrite OR MISPICKEL.

Iron sulpharsenide (FeAsS), occurring in orthorhombic lozenge-shaped crystals, irregular grains or massive; colour, tin-white with metallic lustre. It is a common gangue mineral in tin, copper, nickel, lead, and silver ores, also in gold-bearing veins. Occasionally it is useful as a source of arsenic.

Arsinoë. Name of several Egyptian princesses. (1) Daughter of Ptolemy Soter, wife of Lysimachus, king of Thrace, and after his death of her brother Ptolemy Philadelphus. (2)

Daughter of Lysimachus and wife of Ptolemy Philadelphus. Convicted of conspiring against her husband, she was banished. (3)

Daughter of Ptolemy Auletes, and queen of Egypt (47 B.C.), put to death at Miletus by Mark Antony. Arsinoë is also the name of cities in Egypt and Cyprus, founded in honour of the above or other princesses. See Ptolemy.

Arsis (Greek *airein*, to raise). Metrical term, formerly used for the unaccented as opposed to the accented part (thesis) of a foot. Today the meaning is reversed.

Arson (Lat. *ardere*, to burn). In English law, the wilful and malicious burning of the dwelling-house of another, or place of worship, or public building, or building belonging to any railway, dock, or harbour. It is a felony and is usually punishable by penal servitude, in serious cases for life. Arson also covers the act of setting fire to coal mines, and crops, whether standing or stacked; and to any vessel, whether one of the king's ships or a merchantman. In Scotland arson is known as fire-raising. The penalty for arson in Anglo-Saxon times was death.

Arsphenamine. Arsenical compound introduced into medicine in 1910 by Ehrlich, symbol $\text{C}_{12}\text{H}_{14}\text{O}_2\text{Cl}_2\text{As}_2$. It is also known as salvarsan, and is used in the treatment of protozoal diseases.

Ars Poetica (Lat., the poetic art). A short didactic poem by the Roman poet Horace, also known as the Epistle to the Pisos. It is largely a dissertation on dramatic poetry and abounds in illuminating literary criticism pithily expressed.

ART: IN ITS MAIN ASPECTS AND VARIED FORMS

C. H. COLLINS BAKER, Keeper and Secretary of the National Gallery, 1914-1932

This article and the one on Modern Art which follows immediately are intended to show the changing functions and historic development of the plastic arts as a whole. The subject is further dealt with in articles on special aspects or kinds of art, e.g. Aesthetics; Drawing; Painting; Sculpture; and under the names of individual artists and various countries

By art is meant the human expression of spiritual (as opposed to material) consciousness or perception. In this definition is included any creative achievement expressing man's imagination or translating his emotion. By just the amount that even a bad picture expresses more than photography can express, that picture is art. On the other hand, though imagination of a high order may guide an engineer, a scientist, or soldier to his achievement, yet that achievement, in so far as it is the expression of exact science or the result of mathematical calculation, would not be covered by the definition. Art may be said to be concerned with what is undemonstrable by mechanical or scientific proof and deduction; it ranges from the crudest imagination, e.g. Bushmen drawings, to the vast flights of a Gothic cathedral, a Beethoven, a Rembrandt, a Michelangelo, or Shakespeare.

Art's Earliest Function

Art is one of the characteristic instincts and manifestations of man; though no date can be assigned to the first appearance of artistic expression, it is chiefly on such expression that our knowledge of primeval man is based. Recent criticism has argued that art originally was "talismanic" and utilitarian; that therefore the desire of artistic expression was not innate in man. But while it is not improbable that the earliest function of art was to model and scratch rude images, the possession of which should facilitate hunting or avert attack, yet the remarkable if gradual development of Palaeolithic art convincingly suggests that the desire of art for art's sake was none the less natural to man. Indeed, were it otherwise, artistic expression would wait on rather than fly ahead of popular taste. The earliest known relics of prehistoric sculpture and drawings are calculated to belong to the Mousterian and Aurignacian periods. But their actual date cannot be even approximately ascertained. The best Palaeolithic art, assigned to the Magdalenian era, is represented by the cave drawings and paintings at Altamira and Font de Gaume, etc., which exhibit a surprising freedom and mastery of line in realistic renderings of boars, wolves, bison, etc.

The earliest date assigned to prehistoric Egyptian art is 8000

B.C.; between 5500 and 4000 B.C. the greatest time of Egyptian art was born and had passed over. The renaissance under the XII dynasty, the general decline after the XVIII and XIX dynasties, and the gradual merging into Roman art are the points marking the course of Egyptian art from 3400 B.C. to the Christian era. Its function was almost entirely religious, its purpose the furnishing of the tombs to equip the dead for their future life. Assyrian art (finest period c. 900 B.C.) is famous for its bas-reliefs of the wars and sports of the Assyrian kings. A development of Babylonian and Assyrian art was Old Persian art, in which Greek and Egyptian influences are also felt.

The greatest manifestation of ancient art is Greek, of which the remote origins were Phoenician and Western Asiatic; in its beginnings it borrowed from Egyptian conventions. Again generally in the service of religion, its highest pitch was reached in the 5th century B.C., at Athens, where sculpture at least attained a majesty and technical perfection never again equalled. Greek art declined from the great Hellenic period to the Hellenistic (2nd century B.C.) and thence to the Greco-Roman, to which most of the so-called antique statues belong. Barely a trace of the great period of Greek painting exists; but its greatness is inferred from the peculiar excellence of the vases (best period, the group of Euphronios, d. 450 B.C.), which must reflect the spirit of the more important mural paintings. The outstanding names of Greek sculpture are Myron (first half of 5th century, athletic statues), Pheidias (whose masterpiece the Athena Parthenos was dedicated 438 B.C.), Polycleitos (of the next generation, maker of athletic and religious figures), Praxiteles (first half of 4th century, who introduced the lyric element into Greek sculpture), Scopas, the most modern and passionate of the Greeks (middle of 4th century), and Lysippus; the last of the great masters, the model of the Hellenistic period.

Periods of Ancient Art

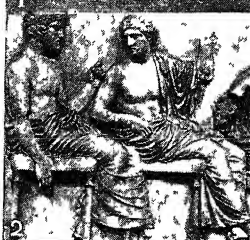
Succeeding manifestations of ancient art are Roman art, the outcome of Greek and Etruscan, specially notable for its superb engineering quality of architecture and for its portrait busts; Byzan-

tine art (best periods between A.D. 330 and 700, and between 867 and 1200), in which Hellenistic tradition blends with Arabic and Persian; and Arab art, in which Chinese, Byzantine, Coptic, and Persian influences mingle with Syrian. Chinese art, which to Far Eastern painting was as Grecian art to European, dates possibly from 2700 B.C.; its greatest periods, the Tang and Sung, are A.D. 618-905 and 960-1280, in which Buddhist ideals are expressed most perfectly. From Chinese roots were sprung the arts of Tibet and medieval Persia (best period 15th century). The greatest era of Japanese art were the 9th to 14th centuries, when a time of decadence set in, and the Chinese Renaissance period, which reached its height in the middle of the 15th century with the Ashikaga period. Japanese art in its inception and its great renaissance emerged direct from Chinese.

Modern European Art and Religion

In the West, Gothic art, sprung from Byzantine and Romanesque, and soaring to its height in the 11th to 13th centuries, is the richest, most mystic, and most imaginative manifestation of Christianity. Following on the great period of Gothic architecture, painting, and sculpture, pictorial art is found definitely outgrowing the old Byzantine feeling. By the close of the 13th century in Italy the Renaissance was established; about the same time, it should be noted, a noble school of mural painting flourished at Westminster. In France and the Netherlands a purely national Renaissance was at its best early in the 15th century.

In modern European art, as for convenience is designated the art of the 14th century and onwards, religion at first played a very large part. The sole function of painting and sculpture was to make graphic and to commemorate the incidents and characters of sacred history. Very rarely was a work of art, before the 16th century, commissioned or executed save as a contribution to the Christian faith, though doubtless the artists felt artistic emotion unalloyed for in their contracts and unsuspected by their patrons. A reservation in the case of portraiture has to be made. Only exceptionally, and in certain local schools, were pagan themes or subjects of contemporary life depicted. This



1. Lion hunt of Ashurbanipal (Assyrian). 2 and 3 Seated and mounted figures from the Parthenon frieze (Greek) 4. Fowling scene (ancient Egyptian). 5. Figure from the Elgin marbles (Greek). 6. Sixth century mosaic from

the basilica of S. Vitale, Ravenna (Byzantine). 7. The great Hebrew prophet Jeremiah, painted by Michelangelo, in the Sistine Chapel, Rome. 8. Madonna and Child, by Raphael, in the Pitti Gallery, Florence

ART: FROM ASSYRIAN SCULPTURE TO ITALIAN RENAISSANCE MASTERPIECES

general statement applies to Italian and northern art alike. At this early date, moreover, the schools preserved their national individuality, and variously illustrated the Bible story with a conviction and intensity never again equalled.

At this time, again, the format of pictorial art was exclusively ecclesiastical, *e.g.* wall-paintings, missal illuminations, shrine and altar pieces, for public churches and private chapels. This state of art lasted, roughly, until the close of the 15th century, when artists found fresh outlets for their interest in the writings of the humanists and in the beauty of the world outside religious themes. Now Romantic art made its appearance and a constant delight in painting scenes of everyday life; now also the distinctive nationality of the schools was broken down, Italian influence flowing out to paralyse northern art.

During the 16th century in Italy mastery of design, monumental decoration, and noble draughtsmanship reached a pitch never again approached; it seems as if in that direction man's artistic quest was satisfied for good. In the same period the earlier technique of tempera, which in Flanders had been superseded in the first quarter of the 15th century, was entirely replaced by oil painting.

From the 14th to the 17th Century

Summing up these two great periods—from the 14th to the last half of the 16th century—is seen the dawn of the Renaissance: the perfection of European religious painting, and the last word, perhaps, in vast schemes of wall decoration and in the science of drawing and painting, as well as portraiture at heights not since regained. Technically, there is first of all tempera painting, then a mixture of tempera, this being some kind of varnish and oil painting, and finally pure oil painting.

Socially the Church at first appears as sole patron of art; then in northern countries came the rise and supremacy of the guilds, the nobles and rich merchants buying pictures for their home enjoyment. Ethically the distinct phases of thought are witnessed when (1) intense conviction produced the highest interpretation of Christianity; (2) such conviction ebbs and is replaced by wider interests and more purely artistic aims. The cardinal names of this period are Giotto, Masaccio, Van Eyck, Donatello, Bellini, Mantegna, and Verrocchio; Giorgione and Titian, Raphael and Michelangelo, Leonardo, Holbein, and Dürer.

From this brief summary, it is

apparent that genre and landscape painting remained to occupy artists' attention. Though these had already received casual treatment, their development came in the 17th century, when the Dutch and Flemish masters, regaining their national individuality, produced an incomparable series of domestic scenes and sea and landscape pieces. The Dutchmen, the French master Claude, and Rubens, the great Fleming, were together the source of all later developments of landscape painting.

Portraiture and Landscape

Nearly all that was vital in art during the 17th century was produced in Flanders and Holland, whence the influence on portraiture of Rubens, Van Dyck, and Rembrandt spread far and wide. Contemporary with them in Spain was Velazquez, the effect of whose genius upon recent painting has been fertile. Other outstanding names for this period are Vermeer, Terborch, Steen; Brouwer, Teniers, and Metsu; Ruysdael, Hobbema, and Van de Velde.

But if genre painting had reached its consummation in the 17th century, landscape was yet in its infancy. In Venice, early in the 18th century, arose the special art of Canaletto and Guardi, while in England the field was being prepared by a line of water-colour painters. Late in that century and on into the 19th, England displayed an unexampled genius for landscape, gathering up the fruits of the older schools, and revealing to the world the unsuspected store of material in out-of-doors nature. From England inspiration was drawn by the 19th century French schools, the Barbizon (Corot, Rousseau, etc.) and Impressionist (Monet, Pissarro, Sisley, etc.), which in turn contributed fresh revelations of the qualities of light and air, and moulded most of recent landscape painting. The great names claiming recognition here are Crome, Cotman, Constable, and Turner.

Watteau's Influence on French Art

What these men did for landscape painting, in demonstrating that nature herself was more profitable than academic formulae, was being done for subject pictures at about the same time by successive movements in France. In the 18th century the battle raged between the followers of the "grand style" (for example, Le Brun, Mignard, etc.), whose creed was that for first-class art only historical painting was possible, and on the other side the painters of genre. Watteau, seeking inspiration for his romantic *poésie* in

contemporary life, revolutionised the conception of French art.

Hogarth, working 1728–1764, in England, had less effect, since there in the 18th century the principal need was portraiture, splendidly supplied by Reynolds, Gainsborough, Romney, and Raeburn. But at about the close of the 18th century in France the discovery by antiquarian research of Greco-Roman art gave classic painting a new turn, which synchronised with the new ideas promulgated by the Revolution. J. L. David and Ingres were the great exponents of this neo-Classical school. Then, early in the 19th century, the Romantic artists (*e.g.* Delacroix, 1798–1863), whose subjects were culled from modern poetry or history, overthrew the Classicists. They in turn were superseded by the so-called Realists (*e.g.* Courbet, Millet, Manet, and Degas), whose theme was the actuality of modern life, its poverty, its vice, its ugliness—in short, its unglamoured truth. The great sculptor of this period is Rodin. Between the Realists and the Academics the battle still continues, the one side fighting for its conception of Truth, the other for its conception of Ideal Beauty.

The Sense of Colour Value

The ultimate effect of the most recent movements, ramifications of so-called Post-impressionism, can hardly be assessed yet; their present result has been to stimulate a sense of colour value. But they may be seen, in the long run, to have been the rudiment of a vital movement. Most of the older European nations have made their special contribution to the plastic arts; it remains for the Slav peoples to show their individuality. The Second Great War's political aftermath smothered, at least temporarily, any development of artistic possibilities.

Necessarily, the above remarks are restricted to a summary of the largest aspects and manifestations of art, leaving aside the numerous crafts (metal work, pottery, textiles, etc.), all of which in their best periods and styles are art of a high order. Speaking generally, the Eastern races have excelled in those crafts which for the utmost perfection depend on qualities of colour and texture. The rugs of Ferahan and Hamadan, the porcelain of the Ming and Kang-hi periods seem to be unapproachable in Europe.

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ART: CONTEMPORARY DEVELOPMENTS

Michael Ayrton, Artist and Art Critic

This article places in their historical perspective such movements as post-impressionism, cubism, vorticism, dadaism, surrealism, etc., which are also dealt with under their own headings

What is known as "modern art," a catchpenny phrase, may be considered as the product of a period extending over approximately fifty years, dating from the full maturity of the post-impressionists and continuing ever since then with rapid actions, reactions, and developments. In actual fact the progression and continuity of the visual arts has gone on, subject to change, but logically, for a thousand years or longer. The term modern or—worse—modernistic is generally applied to forms of art which are not easily understood rather than those which are contemporary; and there are two main reasons why a good deal of contemporary art is not fully comprehensible to the majority. First, we are too near to our own times to be able to see properly the artist's vision of these times. Secondly, the beneficial weeding-out of the dross which is effected automatically over the centuries has not had time to take place in the art of our own day.

There is, however, one very important influence, that of photography, which since the late 19th century has had a more powerful effect on painting than any invention since that of oil paint. It rang the death knell of pictorial realism in painting, and it almost destroyed the profession of portrait painting. Popular photography also became an accepted visual criterion of belief—the image which, supposedly accurate because it was mechanical, serves to show superficially what things look like, for very little money. It became necessary in the 1900s for the painter to depart from the impossible competition set up by this mechanical contrivance; and the main trends during the 20th century have been concerned with the creation of a separate truth, a pictorial truth as opposed to immediate truth to nature.

It must not be imagined that the artist turned his back on nature; but he found it necessary after several hundred years of realistic painting to pursue a new search into natural form.

The course of the visual arts remained as before in the two separate but not irreconcilable streams called "classical" and "romantic," but the actual appearance of pictures changed radically, as it did with the advent of realism during the Italian Renaissance. To define classical and romantic is not easy, but it will serve to say that by classical is meant a purely pictorial and formal approach, concerned primarily with the project and its presentation, whereas romantic implies the subordination of these technical and visual qualities to the expression of an emotion or idea. All painting and sculpture contain both these aspects, but, in some, one approach dominates the other.

Along the classical stream has gone cubism, the product of Paul Cézanne's (*q.v.*) painstaking and profound study of the nature of form, and those several by-products of cubism, vorticism, constructivism, and abstraction, all of which are analytical. Parallel with, and reacting against, this placid stream, runs the tumultuous torrent of romanticism, concerned with the particular rather than the general, and stemming in the immediate past from the powerful and sometimes violent visual expression of Vincent van Gogh (*q.v.*) and Paul Gauguin (*q.v.*). These two great artists of the late 19th century provoked fauvism and expressionism, and were also to some extent responsible for those most violent romantic movements which followed the First Great War, dadaism and surrealism, the leaders of which extolled madness as a creative force.

Each of these streams has put forth tributaries and rivulets which join the two main currents, so that rarely does one find artists exclusively preoccupied with either—indeed, certain of the greatest figures on the contemporary scene combine many trends in their work, *e.g.* Pablo Picasso (*q.v.*), probably the most versatile innovator of the age.

The satellite arts during the present decade have closely fol-

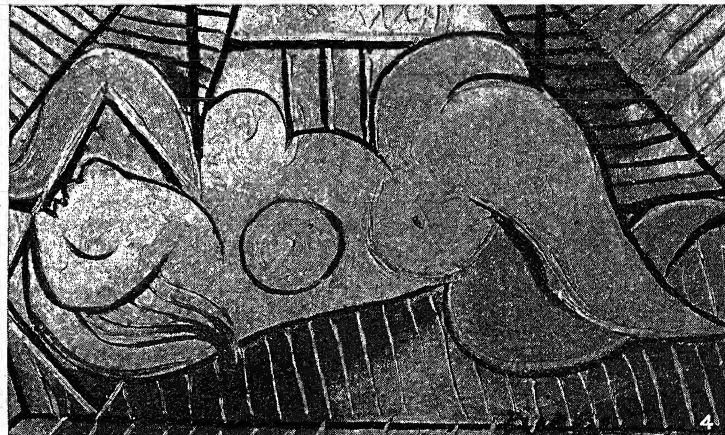
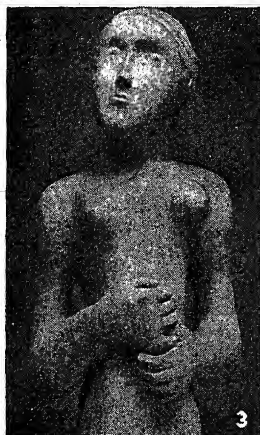
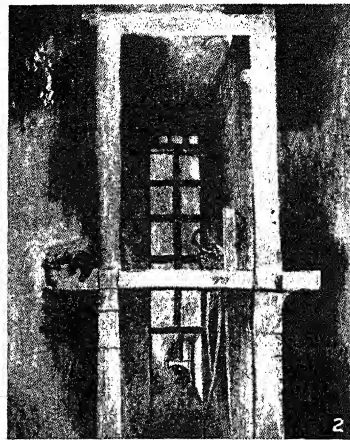
lowed the progress of the major arts. In many cases the finest examples of book illustration, theatre design, textile design, and the graphic arts have been the work of the major artists themselves. At the other end of the scale debasement has followed all too rapidly at the hands of fashion. The best sculpture of twenty years ago appears in crude and garbled imitation as the tailor's dummy of today. The cubist experiments of 1920 are now repeated, shockingly transformed, in the interior decoration of new super-cinemas. Even at its best, applied design almost invariably follows several steps behind the innovations of the two principal visual arts.

Two individuals, neither of whom was an artist, require special mention as being responsible for greatly raising the standard of subsidiary arts: Ambroise Vollard, a picture dealer of genius who turned to publishing illustrated books and was responsible for the flower of 20th century French book production, and Serge Diaghilev (*q.v.*), the famous impresario whose Russian ballet has become a legend and who employed, to design the settings for his productions, the finest artists of Paris. The international fame of Picasso, Henri Matisse, Georges Rouault, and others owes much to these two great middlemen.

Sculpture has pursued a development akin to painting. The influences current in both arts are not wholly dependent on the medium, though the results differ according to the specific problems inherent in paint and stone. Auguste Rodin (*q.v.*) continued the romantic line in his bronzes, and Aristide Maillol (1861-1945) the classic tradition in stone. Constantine Brancusi (b. 1876) may be described as the most potent formal innovator, to be reckoned on a level with Picasso.

In sculpture, as in painting, there have been, and are, artists concerned with cubism, vorticism, constructivism, and the other aforementioned groups.

For a hundred years Paris was the crucible of all trends in the visual arts, though some of the greatest exponents of later years were not French. But since the 1930s it has become clear that this great artistic virility has begun to flag, and that one must look elsewhere for continuance of the European tradition. Evidence suggests that England is the country destined to undertake this task for several generations.

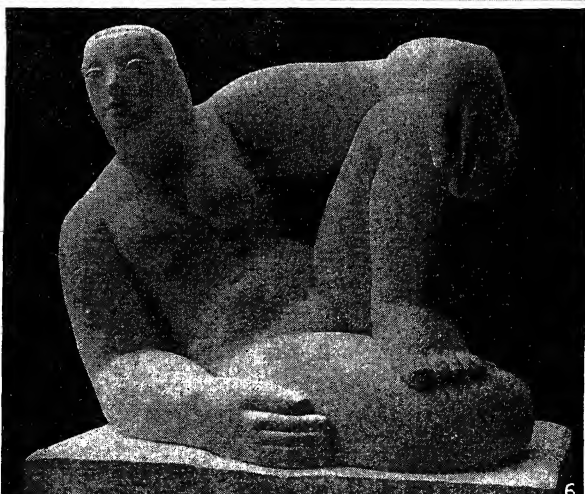
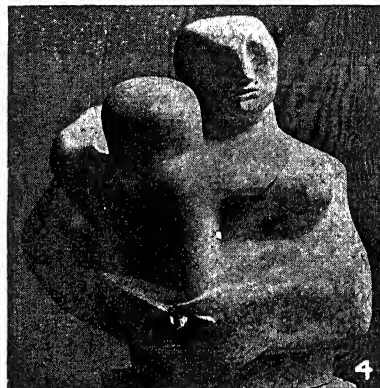
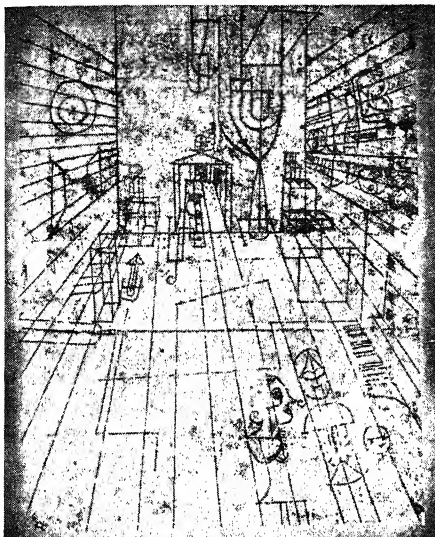


1. Still life, by the French painter Georges Braque.
2. Devastation; coloured drawing by Graham Sutherland. 3. Girl; direct carving from a block of Ancaster stone, by Henry Moore. 4. Nude, by Pablo Picasso,

Spanish painter. 5. Madonna and Child; high relief by Ivan Meštrović (Yugoslavia). 6. Low-relief carving from a series, now in Westminster Cathedral, depicting the Stations of the Cross, by Eric Gill

ART: EXAMPLES OF PAINTING AND SCULPTURE SHOWING VARIOUS WAYS IN WHICH—

Photos: Alex. Reid and Lefevre, Ltd., Crown Copyright, Messrs. A. Zwemmer, Leicester Gall., and Medici Socy., Ltd.



1. Perspective of a room, with inhabitants; drawing by the Swiss artist, Paul Klee. 2. Tube shelter perspective; drawing by Henry Moore, inspired by a familiar London scene of 1940-41. 3. Sunflower Workers, by Stanley Spencer, A.R.A. 4. Mother and Child, carving in stone by Barbara Hepworth. 5. Head of Isobel; bronze by Jacob Epstein. 6. Pax: sculptured figure by Frank Dobson, A.R.A.

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—TWENTIETH CENTURY ARTISTS ARE FEELING AFTER NEW METHODS OF EXPRESSION

Photos, Associated Press, Crown Copyright, Leicester Galls., and Messrs. A. Zwemmer

ART: PREHISTORIC AND PRIMITIVE

E. G. Harmer, *Writer on Archaeology*

Here the author is concerned with the sculpture, painting, and engraving of Palaeolithic Europe and the arts of design as developed among living peoples of early culture. See also Bronze Age; Iron Age; Man; Ornament; Pottery, etc.

At the end of the Mousterian period, which closed the Lower Palaeolithic Age, the rude Neanderthal race ceased to exist in Europe. They were followed by other immigrants from the S. and E., one of whom, the Cro-magnon race, developed, during the early or Aurignacian period of the Upper Palaeolithic Age, a primitive artistic expression of form, colour, and line. At the outset their interest was apparently arrested by the occasional likeness of worn or fractured stones and bones to animal forms, a likeness which they found could be heightened by artificial aid. Thus the earliest objects of art may be regarded as sculpture, and were followed by carvings in low relief.

From these the step was gradual to the incision of figures in stiff, cumbrous profile, and the drawing of them in black or red silhouette upon cave walls and rock surfaces. Later on, uncouth statuettes of the human form were produced, and probably covered with paint, as in archaic Greece and negro Africa. The preference for the female figure in the maternal condition (*e.g.* the limestone Venus of Willendorf and the ivory Venus of Brassempouy) suggests the emergence of religious art. It was, however, the world of useful animal life that was chosen for the most vigorous effort after accurate portraiture.

Work of the Cave Men

After the Solutrian period, during which a distinct race, with little aptitude for fine art, brought westward a skilful stonework, there followed the important Magdalenian period. The growing dominance of man over the vast herds of food-animals among which he lived now ensured a material comfort, and this afforded the still-developing Cro-magnon race time for the arts of pleasure and the practice of ritual religion. The only English example yet found is a horse's head on bone from the Robin Hood cave in Derbyshire (British Museum). But in the Dordogne basin, along the Pyrenean foothills, and in N. Spain more than thirty prehistoric caves have been found, which not only contain many engraved objects and figurines, but are often adorned on wall and ceiling with a realistic series of figures and composite scenes. These are handled at first

in flat tint, but afterwards in brilliant polychrome fresco. The finest of these mural paintings are at Altamira and Font de Gaume. Bisons, mammoths, horses, reindeer are depicted in profusion and with amazing fidelity, and the fact that these drawings portray in many instances animals long since extinct in Europe helps to determine their indubitable age.

Prehistoric Quest for Beauty

The human figures—especially seventy at Alpera—afford invaluable evidence of the style of women's dress, personal ornament, weapons and dwellings, together with ceremonial masks and dancing. The finger mutilations with a sacrificial motive (Gargas) have persisted to modern times. The paint palettes, ochre tubes, burins, and unfinished works attest the technical methods employed; an engraved stone lamp of Eskimo type suggests the means adopted for the lighting of these subterranean corridors. During the Azilian period, which intervened before the Neolithic immigration, Magdalenian art degenerated into stylised forms that travelled along the path towards conventional symbolism which was retaken by other races in later times.

The interest of this prehistoric school lies in the evidence it affords how far the quest for beauty is a primal impulse of the human mind. No attempt is here made to trace it through the Neolithic age, when weaving and pottery introduced new decorative media, into the Ages of Bronze and Iron, the threshold of the modern world. In turning to the art of living savagery, it is to be noted that the wall outlines of human hands in Australia, the animal paintings of the Bushman, the engraved walrus ivory of the Eskimo, virtually impose the acknowledgment of their hereditary relationship to European prehistory. So also many aspects of Aztec and Inca art demand the admission of immigrant influences ultimately traceable to the dissemination of Mediterranean culture over the world's ocean routes by Phœnician mariners. Throughout all ages art tends to flourish or to be reborn under the impulse of new racial contacts. This is why Malay art is poor and unprogressive, whereas Polynesia, under Melanesian influence, developed a virile technique of its own.

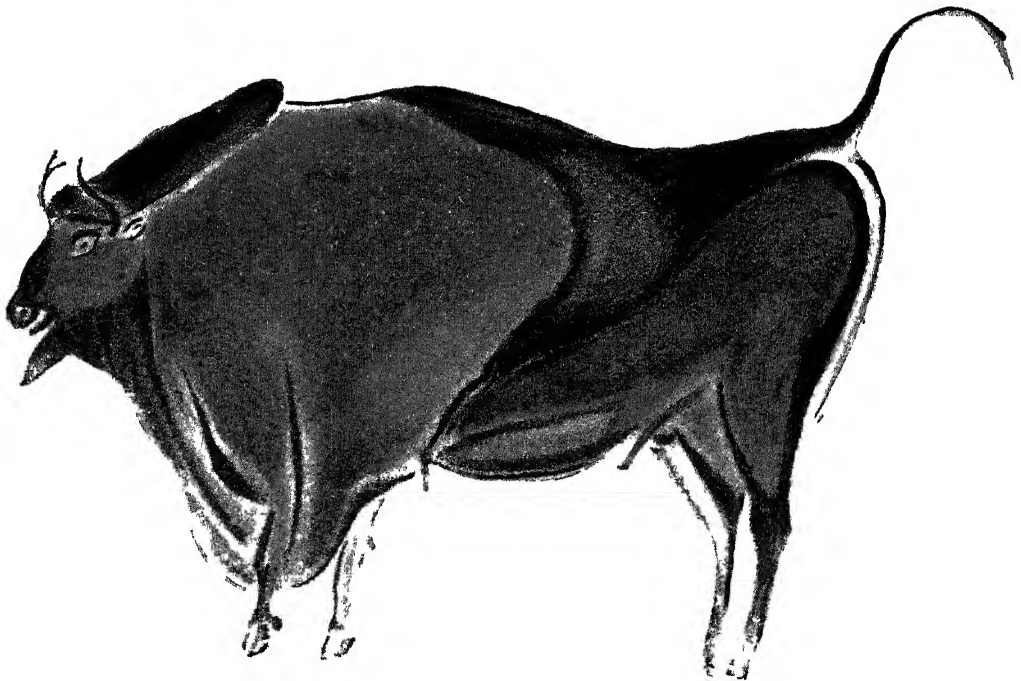
The material of the artist is conditioned by his environment. Pottery and statuary cannot develop where clay and stone are not available, nor can mural painting flourish on a coral atoll. Moreover, human portraiture is repugnant to the animistic mind, and where wooden statuary is found, *e.g.* in negro Africa, in Easter Island, and in aboriginal America, it almost invariably concerns itself with the representation of the divine. Painting, again, is much less practised from the aesthetic point of view than for its magico-religious uses, as in ceremonial masks and shields.

Thus the arts of design tend in primitive cultures to evolve in the direction of decoration, and reach a high standard of attractiveness in such forms as Pueblo Indian pottery, Polynesian bark-cloth, and Maori wood-carving. The principles of decorative art, as developed in savagery, have been laid down by Haddon in connexion with New Guinea. Animal forms tend to be reproduced under the animistic impulses which are connected with totemism and sympathetic magic.

Savagery and Symbolism

Plant forms are religious rather than decorative in origin—the vine leaf as symbolising wine, the lotus as symbolising the energy of reproduction. By the normal processes of decay designs thus motivated become conventional symbols, until at length a serpent or lightning, a human figure or a bird's head, may become a zigzag, a woman's apron or a bat may become a triangle. The simpler geometric forms, such as the circle, cross, spiral, meander, are the debris of complex designs rather than their primitive foundation. Just as the cable and tooth ornaments of bronze implements recall the lashings of their stone precursors, and the interlacings of Greek or American pottery the basketry which gave rise to it, so the floral borders of Hellenic or Indian frescoes owe their origin in many cases to the tufted tassels, weighted against the wind, which fringed the textile hangings of earlier dwellings. When art comes to be employed for recording events and conveying information, it passes into picture-writing, and ultimately reaches the alphabetic symbolism of written history.

Bibliography. The Evolution of Decorative Art, H. Balfour, 1893; The Origins of Art, Yrjö Hirn, 1900; The Childhood of Art, H. G. Spearling, 1912; An Introduction to the Study of Prehistoric Art, E. A. Parkyn, 1915; Primitive Art, L. Adam (Penguin Series), 1941.

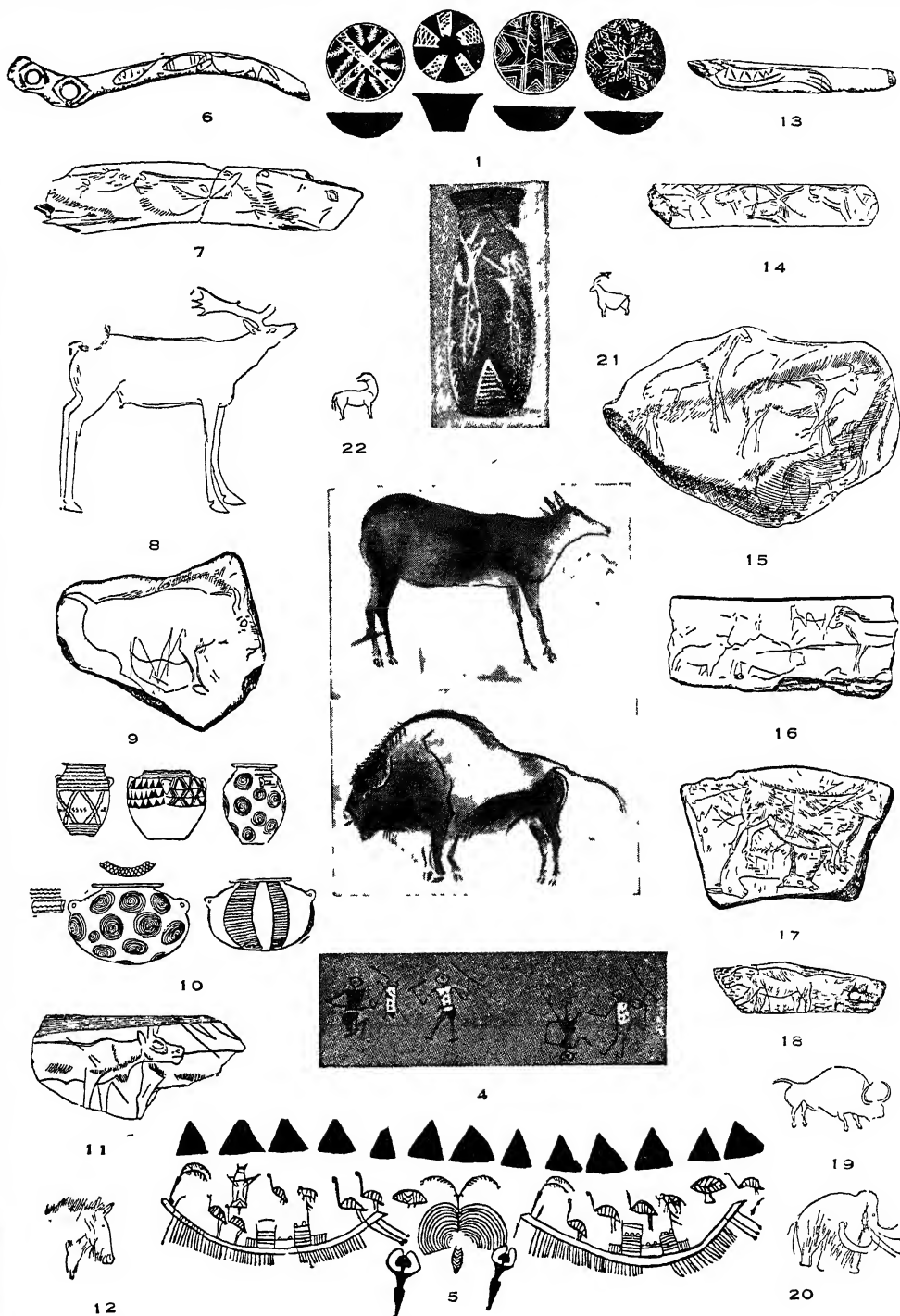


Surviving from the Stone Age, and discovered in 1879 in a cave since named Altamira, these two vividly depicted bison form part of a great ceiling fresco painted in gleaming red, black, and yellow, by

Magdalenian huntsmen-artists. Wherever possible, advantage was taken of the contours of the rock to bring out salient features, while emphasis was given to important lines with a graving tool. See page 345

ART, PRIMITIVE: DRAWINGS FROM THE CAVE OF ALTAMIRA IN SPAIN

From Breuil, Capitan and Cartailhac, "La Caverne d'Altamira"



1. Decorated Egyptian pots of about 7000 B.C. 2. Vessel on which is the earliest representation of fighting. 3. Deer and bison from the drawings in the Altamira cave (see p. 345). 4. Fighting scene depicted on an early Egyptian tomb. 5. Earliest representation of boats taken

from Egyptian pottery. 6 to 9, and 11 to 22, are from engravings on bone and stone and scratching, on rock, mostly discovered in France, 19 and 20 being from Dordogne. 10. Group of neolithic pottery showing various kinds of predynastic Egyptian decoration

ART OF PREHISTORIC MAN FROM PICTURED CAVE AND EARLIEST POTTERY

Arta (anc. *Ambracia*). Town of Greece, in the prov. of Arta. It stands on the river Arta, 7 m. from its mouth, and 40 m. S. of Janina. The river is here crossed by a bridge, formerly a neutral zone between Turkey and Greece. The town has a Byzantine castle, an archiepiscopal palace, a 9th century and other churches, and several mosques. It manufactures woollens, cottons, leather, and embroidery, and trades in cattle wine, and grain.

In ancient times Ambracia was the chief town of Epirus. Colonised about 660 B.C. from Corinth, it became the capital of the kings of Epirus, was taken and sacked by the Romans in 189, and sank into insignificance after the foundation of Nicopolis in 31 by Augustus, who transferred a large number of its inhabitants to the new city. In 1449 it came under Turkish rule, and remained so until its cession to Greece in 1807. Pop. 7,468. The prov. or nome of Arta covers an area of 395 sq. m. Pop. 62,462.

Arta, GULF OF. Inlet of the Ionian Sea, on the N.W. coast of Greece. The ancient Sinus Ambracius, it is almost land-locked, and measures 25 m. in length and 10 m. in extreme breadth. The Arta or Arachthus river, which empties into the gulf, is 60 m. long, and was formerly the boundary of Greece and Turkey. See Actium.

Artaxerxes. Name of three Persian kings: (1) A. Longimanus (long-handed), 464-424 B.C., third son of Xerxes I. He was a successful and energetic ruler, and is generally supposed to be the Biblical Ahasuerus of Ezra and Nehemiah. (2) A. Mnemon (so called from his wonderful memory), 404-358, was a son of Darius II Nothus. The revolt of his younger brother Cyrus, who was defeated and slain at the battle of Cunaxa, 401, is described in the Anabasis of Xenophon, who took part in it with the Greek mercenaries in support of Cyrus. His life was written by Plutarch. (3) A. Ochus, 358-338, son of Artaxerxes Mnemon. He put nearly all his family to death, and was a weak and cruel despot, entirely under the influence of the Egyptian eunuch Bagoas, by whom he was put to death while campaigning in Egypt.

Artemis. In Greek mythology a goddess identified by the Romans with Diana. The reputed daughter of Zeus and Leto, she was born in the island of Delos with her twin brother Apollo. In Greek literature she is usually associated with hunting and like her brother, is



Artemis, Greek goddess; identified by the Romans with Diana
British Museum

represented with bow and arrows. In earliest times she appears to have been regarded as a nature goddess. She was often called the virgin goddess. At the same time she was specially worshipped by women as presiding over childbirth. She was often confounded with Selene or the Moon and her brother with Helios or the Sun.

Diana or Artemis of the Ephesians, mentioned in the Bible (Acts 19), had more of the attributes of an eastern goddess. The statue of her which was said to have fallen from heaven represented a somewhat uncouth-looking woman with many breasts, the whole conception being foreign to the Greek idea. The worship of Artemis is reminiscent of human sacrifice, notably on the shores of the Black Sea and in the grove of Nemus on the Alban hills. Consult *The Golden Bough*, J. G. Frazer, abr. edn. 1922.

Artemisia. In botany, a genus of plants belonging to the family Compositae, including the familiar southernwood (*Artemisia abrotanum*, old man, or lad's love), and the wormwood from which absinthe is made. There are four British species: *A. campestris*, field southernwood; *A. vulgaris*, common mugwort; *A. absinthium*, common wormwood; and *A. maritima*, sea wormwood. Several species yield santonin, a vermifuge.

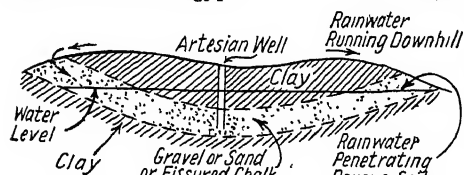
Artemisia (d. 350 B.C.). Wife and sister of Mausolus, king of Caria. Her sorrow for the death of her husband was so great that she is said to have mixed his ashes with what she drank. The Mausoleum which she erected at Halicarnassus to his memory was one of the seven wonders of the ancient world; and from it has come the word mausoleum, to denote a magnificent tomb. Another Artemisia, queen of Halicarnassus, fought on the side of Xerxes at Salamis (480 B.C.).

Arteriosclerosis (Gr. *artēra*, artery, *sclerosis* hardening). The term covers four distinct arterial conditions. (1) the result of chronic inflammation; (2) atheroma, where calcification takes place in the inner coat of the artery; (3) degeneration of the middle coat of the artery with deposit of lime salt in rings; (4) hypertrophy of the muscle of the artery. All these changes result in a narrowing of the lumen, affecting the blood supply of the organs. Sclerotic arteries do not readily respond to any extra demand made on them. Failure of the vessels to carry sufficient blood under stress may cause cramp in the legs or angina of effort in the heart.

A degree of arteriosclerosis is normal to advancing age by reason of chemical and constitutional changes. Thickening of the arteries of the brain impairs memory and lessens flexibility of mind, and the condition contributes to loss of weight, weakness and fatigability. The victim will have the arteries of the temples thickened and prominent. Invariably present is a raised pulse pressure. Treatment is aimed at the removal of any toxic or other cause. Often, however, the outlook depends on whether the forces of repair can balance the forces of degeneration.

Artery (Gr. *airein*, to raise). Vessel which conveys blood from the heart to another part of the body. The main artery of the body, the aorta, which springs from the left ventricle of the heart, conveys arterial blood through its branches to all parts of the body. The pulmonary artery conveys venous blood from the right side of the heart to the lungs. In structure the wall of an artery consists of three coats (1) the external coat or *tunica adventitia*, the strongest and toughest part, formed mainly of areolar tissue; (2) the middle coat or *tunica media*, composed of muscular and elastic fibres with some areolar tissue; and (3) the internal coat or *tunica intima*, formed of elastic tissue.

Artesian Well. A small-diameter well sunk with a boring or drilling apparatus into water or oil-bearing strata from which the liquid rises by its own pressure to the top. Such wells are so called as they are said to have been first sunk at Artois, in France, though known in ancient Egypt.



Artesian Well. Geological conditions favourable for water supply from an artesian borehole

Artevelde, JACOB VAN (c. 1290-1345). A Flemish popular leader. He was born at Ghent and according to tradition was a brewer. In 1337, when the import of English wool for the Flemish weaving industry was stopped by the opening of the Hundred Years' War, he headed a movement against Louis, count of Flanders, a supporter of France, banded together the Flemish towns, and made a commercial treaty with England. He was designated captain-general of Ghent, and by 1340 the whole of the Netherlands had joined the federation. His despotic government and his suggested deposition of the count of Flanders in favour of the Black Prince provoked a popular rising, in which he was killed by the mob, July 24, 1345.

A bronze statue was erected in Ghent in 1863. *Consult* James and Philip van Atevelde, W. J. Ashley, 1883.

Artevelde, PHILIP VAN (c. 1340-82). Flemish soldier. A son of Jacob van Artevelde, he did not become known until 1381, when the burghers of Ghent revolted against their lord, the count of Flanders. They then selected him as their leader and in a short time he had driven the count from practically all Flanders. The count appealed to the king of France, Charles VI,

who led a large army to his succour. This met the forces of Artevelde at Roosebeke, Nov. 27, 1382, and defeated them with heavy loss, the killed including their leader. His life is the subject of a drama by Sir Henry Taylor, 1834.

Artful Dodger, THE. Nickname of John Dawkins, a character in Dickens's novel, *Oliver Twist*. A precocious young London pick-pocket, the most promising pupil of the old Jew, Fagin, he introduces *Oliver Twist* to Fagin. His career is ended by transportation.

Arthritis (Gr., disease of the joint). The term denotes a change taking place in the structure of a joint and leading to loss of its movement. This change may be caused by injury, acute

fevers, venereal disease, tuberculosis, or gout, and may occur without known cause at the climacteric. A septic focus, such as a dead tooth or an infected tonsil, may be the predisposing factor. A family history of arthritis is common. The disease is not hereditary, but the tendency for joints to be affected, when a person is subjected to an exciting infective cause, is inherited. Dietetic errors were once thought to have a bearing on arthritis. Now it is realized that metabolic error plays no part. A diet deficient in vitamins, however, predisposes to infective conditions and to arthritis. Rheumatoid arthritis and osteoarthritis, two common non-specific forms, are probably due to an infection not uniform in origin. *See* Gout; Rheumatism.

Arthropoda (Gr. *arthron*, joint. *pous*, foot). One of the great phyla into which the Invertebrates are divided. The name means jointed-footed—one of the distinguishing features of the group, which includes the spiders, mites, insects, centipedes, and crustaceans. All have a body formed of rings which mark its division into segments more or less clearly according to the degree to which these segments have become fused. The limbs belong properly one pair to each segment, but they may be suppressed in some segments, and greatly modified to comply with various functional requirements, e.g. those of sense



JACOB VAN ARTEVELDE ACCLAIMED AS POPULAR LEADER IN 14TH CENTURY FLANDERS

Painting by G. Van der Meulen in Ghent Museum

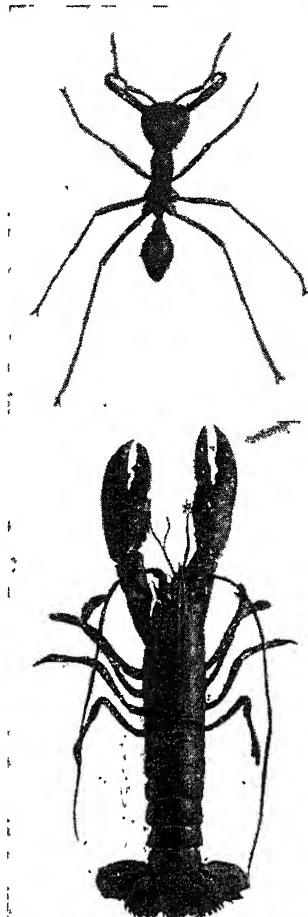
feeding, and respiration, in addition to locomotion. The body and limbs are covered by a cuticle of an organic substance called chitin. Muscles are attached internally, and the chitin remains thin at the joints. This allows movement. The moulting of the cuticle at intervals allows growth to take place intermittently. The nervous system is ventral, but with a dorsal anterior "brain." Reproduction is usually sexual and oviparous. There is generally a metamorphosis, perhaps several. Many arthropods are active, and the development of flight in the insects is important in the dispersal of that class. There are important examples of parasitism in ticks, mites, fleas, etc. Social life has become highly developed in some insects. Most fossil arthropods are crustaceans, in which are included the trilobites.

Arthur. Masculine Christian name meaning high. It is Celtic in origin and has long been common in England and Wales. The rare feminine form is *Arthurene*.

Arthur. British king or chief. There is no contemporary mention of him, but he occupies a large place in the hinterland of history where it merges in myth and romance. His name first occurs as that of a military leader in *The History of the Britons* by Nennius, ascribed to the close of the 8th century. There he is said to have been twelve times chosen as commander of the British kings against the Saxons, and to have been as often victorious. This account is quite compatible with there having been a British leader of this name. It was after battle with his nephew Mordred in 542 that Arthur, mortally wounded, passed to the island of Avalon.

A popular belief that Arthur did not die, but would return when needed, connects his story with that of other national heroes. In William of Malmesbury's *De Gestis Regum* (1142) it is stated that the ancient ballads said that Arthur would come back. In *The Chronicle of Roger of Wendover* it is recorded under date 1191 that his grave had been found at Glastonbury, and a sarcophagus with a leaden cross inscribed: Here lies Arthur king of the Britons, buried in the island of Avalon. The chronicler adds that Glastonbury was surrounded by marshes and called the island of Avalon.

The earliest detailed account of Arthur is in the *Historia Regum Britanniae* of Geoffrey of Monmouth, 1147. That Geoffrey's work, which he describes as a



Arthropoda. The general structure is shown in these photographs of the Lobster and (above) a Brazilian species of Ant (*Eciton hamatum*)—the body composed of segments and the limbs and other appendages all jointed

translation of a very ancient book in the British tongue, is romance rather than reliable history is so plain that it may be responsible for the common belief as to Arthur being an entirely mythical person. Geoffrey's history contains much of the legendary story of Arthur, as the son of Uther Pendragon, the friend of Merlin, the conqueror of all enemies, and the founder of a court of chivalrous knights. Here is found the earliest ascertained foundation of much of the Arthurian legend. Yet it has been established that the legend was known earlier than the time in which Geoffrey wrote, so his share is probably rather that of one who embroidered than of one who invented.

The Arthur of the romantic tales, the blameless king who established

the knights of the Round Table, and has come to be regarded as the finest flower of chivalry, is by some authorities supposed to have been a Continental figure, adopted into British tradition after the Norman conquest, while others look upon it as a British romance carried to France, where it inspired many writers. The knightly king of chivalry, Arthur of the Round Table, became definitely established in literature as a British figure of romance by the compilation of the *Morte d'Arthur*, completed 1469 or 1470 by Sir Thomas Malory, and it is this romance figure which is celebrated by Tennyson in *The Idylls of the King*. See Malory; *Morte d'Arthur*; Round Table.

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Arthur (1187-1203). Duke of Brittany. Born March 29, 1187, he was the son of Geoffrey, the fourth son of Henry II of England. Arthur's claim to succeed Richard Cœur de Lion was superior to that of John, the fifth son of Henry II. From his mother, Constance, he inherited Brittany, and on Richard I's death, 1199, the nobles of Maine and Anjou refused to recognize John, and declared Arthur king of England. Arthur himself never claimed the throne of England, but was invested with Normandy, Brittany, and other lands in France by Philip Augustus of France. Against John's overlordship of these lands the nobles rebelled, and Arthur was declared their chief.

In 1202 Arthur was captured by John at Mirebeau, in Poitou, placed in the custody of Hubert de Burgh, and in 1203 removed to Rouen, where he was murdered, either by John himself or by his orders. In Shakespeare's *King John*, John is represented as ordering Hubert to have the young prince's eyes put out—a command he refuses to obey, while Arthur, a boy, decides his own fate by leaping from the walls of Northampton Castle.

Arthur, PRINCE (1486-1502). Eldest son of Henry VII of England. Born at Winchester, Sept. 19, 1486, he was early destined for diplomatic reasons to be the husband of Catherine of Aragon, daughter of Ferdinand

and Isabella of Spain. Catherine came to England, and the marriage took place in S. Paul's Cathedral, Nov. 14, 1501. Arthur died at Ludlow, April 2, 1502.

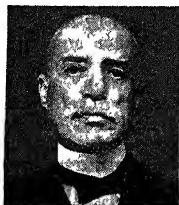
Arthur, CHESTER ALAN (1830-86). President of the U.S.A. Born at Fairfield, Vermont, Oct. 5



Chester A. Arthur

1830, he was the son of an Irish Baptist minister. He successfully practised law and during the Civil War served as inspector-general and quartermaster-general of New York State. Appointed collector of customs for the port of New York in 1871, he was dismissed in 1878 for opposition to civil service reform. Elected vice-president on the republican ticket in 1881, he became automatically president on the death of Garfield, holding office 1881-5. His presidency was marked by the passing of the Tariff Act 1883, and by a law prohibiting polygamy in the territories. He failed to obtain presidential nomination in 1884, and died in New York City, Nov. 18, 1886.

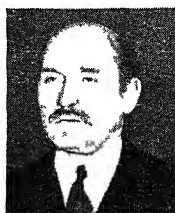
Arthur, SIR GEORGE COMPTON ARCHIBALD (1860-1946). British soldier and biographer. Born April 30, 1860, and educated at Eton and Christ Church, Oxford, he was gazetted in 1880 to the 2nd Life Guards and saw service in Egypt and South Africa. Private secretary to Lord Kitchener, 1914-1916, he wrote that soldier's biography in 1920; also the lives of Wolseley, 1924 (with Sir F. Maurice), and Haig, 1928. Studies of Queen Alexandra, 1934, Queen Mary, 1935, and Seven Heirs Apparent, 1937, showed his knowledge of English court life. He died Jan. 14, 1946.



Sir George Arthur,
British author

Arthur of Connaught, PRINCE (1883-1938). Member of the British royal family. Only son of the 1st duke of Connaught (*q.v.*), he was born at Windsor, Jan. 13, 1883, and was christened Arthur Frederick Patrick Albert. Educated at Eton, he was in 1901 commissioned in the 7th Hussars, and saw action in South Africa. In the First Great War he was attached to the staff of the British

C.-in-C., and served for some time in France. Having been entrusted with various diplomatic missions he was made governor-general of South Africa, 1920-24. He was a fellow



of the Royal Society and president or chairman of several London hospitals. In 1913 he married his cousin Alexandra, duchess of Fife. He died before his father, on Sept. 12, 1938, so that his only son, long known as the earl of Macduff, became in 1942 the 2nd duke of Connaught (*q.v.*).

Arthur's Seat. Hill in Scotland. It overlooks Edinburgh and is an irregular and picturesque basaltic eminence, 822 ft high, in shape like a lion couchant. From the summit, said to be named after King Arthur, an unrivalled view is obtained of the city and its surroundings. At its base is the palace of Holyrood, and close by are the Salisbury Crags, a crescent-shaped escarpment ranging between 60 ft. and 70 ft. in height. See Edinburgh.

Artichoke (Arab. *al kharshuf*). Name of two distinct edible vegetables, the globe artichoke (*Cynara scolymus*) and the Jerusalem (*Helianthus tuberosus*) artichoke (*Helianthus tuberosus*). Globe artichoke is propagated by planting seeds in spring, and transferring them in the second year to permanent groups in soil well broken up and manured with coal ashes or seaweed. The edible portion is the leaves or scales of the flower heads, which are produced from June to August.

Jerusalem artichoke is the more popular. It was introduced from America, and is prepared and grown similarly to the potato. The best soil is one of dry loam, with a top dressing of leaf mould. It is one of the most easily cultivated vegetables, needing only a little loosening of the soil after planting, and the pinching out of the tops of the plants before they flower, so as to increase the size of

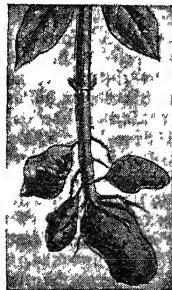
the roots. In appearance the root resembles a turnip in colour, and a sweetened swede turnip in flavour. Cultivation in Britain has been greatly neglected. Jerusalem artichokes yield easily a hundred gallons of tubers per acre, and in addition to being an excellent article of food for human beings, are the best feed for milch cows that can be devised. Frosts do not check them, and they are immune from insect pests. See Market Gardening.

Article (Latin *articulus*, small limb). Part of speech preceding a noun to mark it definite (the man) or indefinite (a man). The definite article of modern European languages is the demonstrative pronoun used in a weak-



Arthur's Seat, famous hill near Edinburgh, as seen from St. Leonard's Gate
Valentine

ened sense (French *le*, Italian *il*, Spanish *el*, Latin *ille*). The indefinite article is derived from the numeral of unity (English *an*, Fr. *un*, Lat. *unus*). They generally precede, but in some languages, such as Rumanian and the Scandinavian group, follow the noun they qualify. Greek (ancient and modern), Hebrew, and Arabic have the definite article; Sanskrit, Latin, Russian, Persian, and Turkish have neither.



Artichoke. Two heads of the globe artichoke and (above) tubers of the Jerusalem artichoke

Articles of Association. Rules and regulations drawn up for the conduct of a limited liability company. Under English law they deal with the number, qualifications, and remuneration of directors, payment of dividends, matters affecting capital, and the general conditions of management and organization. The articles must be prepared when the company is formed, circulated among those interested, and a copy deposited with the registrar of joint-stock companies. They must observe the conditions laid down in the company's memorandum of association, be signed by those who subscribe to that memorandum, but, subject to this condition, can be altered by resolution of the shareholders. A stamp duty is payable on them. The Companies Acts of 1862 and later dates provide a model set of articles which may be adopted wholly or in part. See Company Law.

Articles of War. Code of discipline. They were drawn up for the British army in the 15th century or earlier, for the period of a war, when the troops were ordinarily subject only to the law of the land, *i.e.* before the passing of the first Mutiny Act in 1689. Power to make articles of war is still reserved to the crown. During British rule in India the Indian army was subject to articles of war made by the government of India. Down to 1878 Articles of War together with the Mutiny Act constituted the military law, but in 1879 both these codes were superseded by the Army Discipline and Regulation Act, and this in turn was replaced in 1881 by the present code.

Artificer. In the British navy, a highly skilled tradesman of the engineer, ordnance, electrical, or naval aviation branches. There are two methods of entry, the first as an artificer apprentice, aged 15 to 16, in which case the training is entirely naval; the second is to join direct as a 5th or acting 4th class artificer, this being determined by age, after serving a recognized full apprenticeship in an outside engineering firm and passing a trade test. A limited number of artificer apprentices who distinguish themselves in work and recreation and are likely to make good officers are selected each half year for entrance to the Royal Naval Engineering College, Keyham, as cadet (E). Pay ranges from 7s. 6d. a day (acting 4th class) to 12s. 6d. a day (chief rate) and there are opportunities

for rising to warrant and commissioned rank.

Artificial Flowers. Articles manufactured chiefly for the ornamentation of ladies' wearing apparel, and for making wreaths and crosses. They have been used for various other purposes, such as the decoration of tables, and as emblems or tokens in connexion with charitable organizations.

The materials chiefly used in the manufacture are cambrics, jacquets, and other fine varieties of calico, muslin, velvet, small feathers, crêpe, gauze, and various yarns and threads. The leaves are stamped from green and yellow taffeta, etc., and with the petals and sepals are goffered to the required shape. Buds are made of taffeta stuffed with cotton-wool, while the stalks are fashioned in wire and covered with green or other coloured materials. Blown glass, brass, and mother-of-pearl are also employed, while wax is also used. Mourning wreaths for tombs are constructed of enamelled iron, pottery ware, and like materials.

The chief makers for many years were French, although British, Dutch, and Belgian workers were proficient in this art. About 1900 the Germans and Austrians began to interest themselves in the trade, and entered upon the exploitation of the English and other markets. In England, manufacture is not confined to any particular locality, charitable institutions generally falling back upon this craft for the employment of the infirm or disabled. An outstanding example is the poppy made by disabled ex-servicemen and sold on the day before Remembrance Day.

Artificial Gem Stones. Imitations of precious natural stones. Artificial gem stones, as distinct from synthetic gem stones (*q.v.*), which have chemically the same composition as the stone imitated, have been made from the earliest times. The pastes used by the ancient Egyptians both for beads and for scarabs were coloured after the manner of lapis lazuli and turquoise, and had the opacity of these stones.

Modern artificial gem stones consist of a hard and brilliant glass coloured in manufacture to represent the real gem. Imitation diamonds are frequently made from strass, a variety of glass prepared by fusing a mixture of powdered quartz, red lead, and potassium carbonate with small amounts of arsenic and borax. The addition of thallium when

fusing the mixture yields a paste resembling the diamond in optical properties. The various precious coloured stones are made from strass by the addition of the appropriate colours during fusing: cobalt oxide gives blue; copper or gold salts, red; and copper or chromium oxide, green. The distinctive blue of the sapphire is obtained by the addition of small quantities of titanic oxide (rutile) and magnetic oxide of iron.

Jargoon, a transparent variety of zircon, is frequently used to imitate diamonds, being painted on the back with a luminous paint to make it more brilliant.

Natural rubies and emeralds are both composed of a natural crystallised oxide of aluminium called corundum. In its natural state, corundum is transparent and plentiful, and has no value as a precious stone; it is only when traces of iron or titanium are present in the crystals that they have the rich colour that gives them value as gems. Iron colours the corundum red, as in the ruby; and titanium is responsible for the blue of the blue emerald. By means of a double blow-pipe, one tube of which plays a flame on to a piece of pure corundum, while the other sprays the heated corundum with powdered chromium, an artificial ruby is built up. The chromium is deposited in layers on the corundum, and although the resultant "ruby" passes superficial tests, its artificial origin is betrayed by microscopic examination, which reveals striations, the curves of which correspond to the layers of chromium blown on to the corundum; but processes have been developed which eliminate even these markings.

Many of the larger and more expensive artificial gem stones consist of an upper and lower layer of genuine stone with an intermediate layer of suitably coloured glass.

Artificial Insemination. Any method other than by sexual intercourse of introducing the seminal fluid into the female generative passages. It is now frequently employed in raising the quality of stock, as the seminal fluid of a good sire can travel long distances in a suitable medium at a suitable temperature. Artificial insemination has been used in both Europe and the U.S.A. for human procreation, but many complicated medical, legal, and religious considerations bear upon the practice. See Reproduction.

ARTIFICIAL LIMBS: USE & APPEARANCE

A. A. Atkinson, M.B., Ch.B.

The writer, who is medical director of the Ministry of Pensions limb-fitting service at Roehampton, London, describes modern developments in the construction and fitting of artificial limbs of all kinds. See also articles on Amputation • Surgery.

In Great Britain before 1914, the manufacture of artificial limbs was a comparatively small industry, the limbs were too heavy, the design was not good, and fitting to the stump and body was haphazard. In the First Great War 41,000 British servicemen lost limbs (this number does not include Dominion or Colonial troops). The state was faced with the problem of providing limbs for this number of patients, and British limbmakers were unable to meet the demand. Accordingly, Roehampton House was purchased by a committee from funds subscribed publicly. The committee invited limb-making firms in America to establish branches at Roehampton, and the ministry of Pensions, when it was formed, to make use of the centre for ex-servicemen who had lost limbs in the war. The ministry established experimental and research workshops to effect improvements in the design of artificial limbs. Valuable improvements were made by a private British firm which had manufactured the first light metal leg, and were then producing a small number, but not sufficient to meet the requirements of the large number of disabled ex-servicemen for whom limbs were supplied in duplicate, and renewed when necessary.

Natural Appearance

The modern articulated artificial leg can be made to resemble closely the shape of the natural limb. It has joints designed to permit free natural movements. Owing to the shape and free movements, it is often difficult, where one leg has been lost, for an observer to perceive any difference between the natural and the artificial leg. In many cases of double below-knee amputations it is equally difficult to detect the fact that the patient is walking with two artificial legs. In high thigh amputations the disability is more obvious. The function of the lower limb is mainly locomotion; and this can be restored to a remarkable extent by an artificial leg that has been correctly fitted.

Persons who have undergone an amputation above the knee have walked from London to Brighton

or climbed to the top of Snowdon; these are exceptional examples, and patients are not encouraged to emulate these feats, but they are encouraged to engage in a variety of games and sports, and to take plenty of exercise.

The correct alignment of the component parts of the leg to each other, to the stump, and to the body as a whole, is a subject of great importance. If the socket is not of the proper size and shape it is uncomfortable, and if the alignment is wrong the patient will walk badly, and put undue strain on parts which are likely to break. Certain parts of the leg, e.g. joints, may be of standard pattern, but there is no standard size or shape of socket. Each one has to be specially made to fit the individual, and the alignment also has to be adjusted to individual requirements. It is agreed that for both use and comfort a leg of good design which has been badly fitted is worse than a leg of poor design which has been correctly fitted.

Construction of Artificial Legs

Artificial legs should be constructed from the lightest available materials, and yet should be strong enough to take the weight of the body and the strains imposed on them. They should have sufficient margin of safety in strength to stand up to unusual stress and strain. The material which is most popular in this country for the shell of the limb is duralumin. Some limbs for amputations below the knee are mainly constructed from willow, while others for amputation at the ankle joint are made from leather with reinforcing steel strips. The type or pattern of the leg depends to a great extent on the site of amputation.

For amputations at or near the hip joint, where there is little or no stump, a saucer- or dish-shaped socket is made to enclose the buttock and part of the pelvis on the side of the amputation. The socket is attached to the thigh piece by a hip joint which can be kept in a fixed position in walking or standing, and unlocked by the patient when he wishes to sit down. The socket is securely strapped to the pelvis. Apart from the socket and hip

joint, the remainder of the leg conforms to that now to be described for an above-knee amputation.

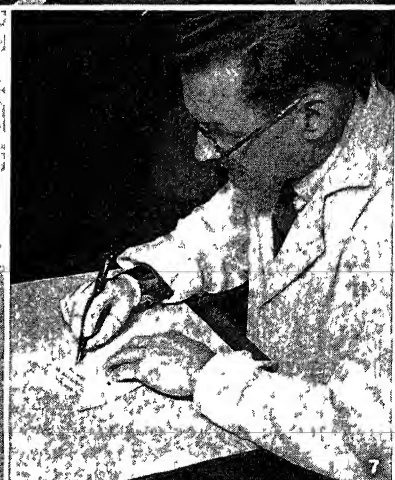
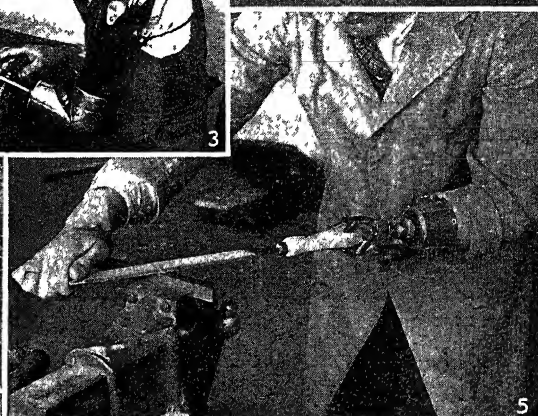
In this amputation the stump is fitted into an accurately shaped socket in the thigh piece which articulates with the shin piece, and the shin piece articulates with the foot, which has a jointed toe piece. The leg is usually attached to the body of the patient by means of a pelvic band; between the pelvic band and the top of the socket there is a hip joint.

Both the design and position of artificial joints are of great importance. When an artificial joint is superimposed on an existing natural joint, the axis of both joints should be in the same line. In the leg now being described the hip joint permits flexion, extension, adduction, abduction, and rotation. In this amputation the natural knee joint has been removed, and in order to permit free movement in walking and stability when standing, the position of the joint is placed just behind the centre of the knee piece. If it is placed at or in front of the centre the knee tends to shoot forward or flex when weight is put on the leg. If it is placed too far back the knee does not flex easily in walking. The ankle joint is placed vertically in line with the middle of the leg and permits about 30° of flexion and extension movement; lateral movement can be provided for, but is usually considered to be unnecessary. The toe joint is placed just in front of the instep, and in the same position as the corresponding joint in the human foot.

Movements made at the ankle and toe joints are controlled by pieces of rubber which by compression and expansion give an elastic or resilient action in walking. The knee joint has a spindle which passes through the knee piece; this part is set in ball bearings. An adjustable friction brake is also incorporated in order to control movements as well as to prevent an excessive amount of flexion in walking.

Amputation through Knee Joint

It has been observed that for amputations above the knee the artificial leg, with the exception of the foot, is usually made of light metal. Where the amputation is made through the knee joint the lower end of the stump is usually more bulky than the normal size of the limb higher up; this makes it difficult to insert the stump into a well



1 Section of the workshop at Queen Mary's Hospital, Roehampton. 2. Child, who has had an amputation below the knee, skipping with an artificial leg. 3 Above-elbow amputee typewriting 4 How digging can be

done after a below-elbow amputation. 5. Use of an artificial hand for filing metal in a vice 6. First steps with a newly fitted leg at Queen Mary's Hospital 7. Writing with artificial hand and spring grip

ARTIFICIAL LIMBS: TYPES OF APPLIANCE AND METHODS OF ATTACHMENT

Photos, 1, 3 and 6, *Topical Press*; 2, *Daily Mirror*; 4, 5 and 7, *Min of Lab. and Nat Service*

fitting metal socket and so the socket is usually made of leather with an opening down the front which can be laced or unlaced when the leg is being put on or taken off. The knee joint suitable for above-knee amputation cannot be used, as it would damage the lower end of the stump or, if placed at a lower level, would make the shin so short as to be unsightly in the sitting position. Lateral joints are, therefore, placed on the sides of the knee piece: this increases the width of the knee to a considerable extent. The shin piece and foot are similar to that described earlier for amputations above the knee. The leg is suspended to the body either by a pelvic band or by shoulder braces.

Amputation Below the Knee

For amputations below the knee, the artificial leg is attached to the body mainly by a thigh corset made of leather, which opens down the front and is laced to the thigh when the leg is put on. Shoulder or waist suspenders are also used. Lateral knee joints are fixed above to the thigh corset, and below to the socket. The position of these joints is important. The centre of movement of the human knee joint changes its position in flexion and extension of the knee, and it is difficult to design an artificial knee joint which will follow the centre of movement of the human knee. Considerable success has, however, been obtained from a polycentric knee joint made at Roehampton. When an artificial joint with a fixed centre of movement is used the optimum position for it is at the junction of the anterior two-thirds and the posterior third of the knee, and on a level with the tubercles of the femur. When a metal leg is used the socket is made from leather blocked on a cast of the stump; the cast has, however, to be built up by a skilled craftsman and shaped to remove pressure from prominent bones or tender parts of the stump. The leather socket is contained in the hollow metal shin piece. The foot is made of willow. A number of patients prefer the wooden below-knee leg in which the socket and shin are made of willow. The socket is carved out by a highly skilled wood worker.

The limb or appliance for amputation at the ankle joint is somewhat bulky round the ankle, since it has to enclose the bulbous end of the stump; it must also be of

strong construction. To admit the end of the stump the socket is made of blocked leather reinforced with steel supports; it has a gaiter which, when the stump is in position, permits the appliance to be laced securely on the stump. The lower end of the stump rests on a cushioned platform, thus permitting end bearing. This is the great and indeed the only advantage claimed for what is called the Syme amputation, after the name of the surgeon who originated the technique of the operation. An ankle joint is placed beneath the platform. It should be noted that this amputation is unpopular with women patients who do not like the ugly appearance of the artificial ankle; they prefer to have the amputation at a higher level, and use the artificial limb described for a below-knee amputation which has a natural shape.

Natural Appearance of Arms

The modern artificial arm can, within certain limits, be made to resemble the shape of the natural arm. Some patients prefer to have a light dummy or shell arm with simple joints, called a dress arm; it is used mainly to restore appearance. Other types used for manual work are heavier and have more complicated joints, and mechanism, designed to actuate various movements: in these arms the hand is often more for appearance than use, for it can be detached at the wrist and appliances substituted for work. The function of the arm and hand is to make many movements, to grasp and hold heavy and light articles: the ability of the fingers to make complicated manipulations depends largely on the sense of touch.

Even the most ingenious mechanical fingers devoid of this sense and of control from the brain cannot restore the function of the lost hand. Nevertheless artificial substitutes can be provided which are useful for many purposes. The type of arm suitable for a particular patient depends on the site of amputation, and his occupation.

After amputation at the shoulder joint, the artificial arm is not of much value for manual work, as there is no stump to control movements. An arm can, however, be suspended to the shoulder and is capable of carrying a coat or attaché case. A dress arm is used to fill the sleeve and restore appearance. After amputation through the upper arm, there is generally a useful stump on to

which the socket of the artificial arm can be fitted. The socket articulates at the elbow joint with the forearm and the latter with a hand which is usually detachable. The arm is attached to the shoulders by straps of webbing which pass across the back; a loop is attached to the opposite shoulder. Some movements of the arm can be made by the stump; other movements, such as flexion and extension of the forearm, are made by cords or thongs which pass from the elbow joint to the shoulder straps; when the shoulders are moved forward tension is put on the cords which move the forearm. The hand can be detached at the wrist and replaced by tools or appliances used in any particular occupation. The forearm is often bisected at a higher level; the lower part can be detached and replaced by tools closer to the end of the stump, which increases the power which can be applied to the tools. Rotation movements can be made at the bisected joints.

Incidentally, the disablement caused by an amputation in the upper arm is very much greater than where the elbow joint has been saved, and there is, moreover, a useful below-elbow stump.

For Amputation Below Elbow

Most of the arms used after amputation below the elbow are attached to the upper arm by means of a lacing leather corset, or a strap. The elbow joint may be made of leather side straps connecting the corset to the socket, or the side straps may be steel with a box or other type of metal joint. The stump fits into a socket which may be bisected just below the end of the stump or at the wrist as described for amputations above the elbow. Where the wrist has been saved, the useful movements of pronation and supination (*i.e.* turning of the hand so that the palm faces up or down) are usually preserved; and although it is undoubtedly somewhat difficult to fit the stump into a socket of neat appearance, this can be done.

Men who have had both hands blown off, and at the same time lost their vision by explosion of bombs and mines, present serious problems to the surgeon, the limb-makers, and to St. Dunstan's. A remarkable characteristic of these patients is that usually they are cheerful and consider that life is still attractive. Many of them are emphatic that they wish to appear normal, and for that purpose they are provided

with artificial hands. They are also provided with arm appliances specially designed to meet their individual requirements. The artificial hand can be attached to the forearm by a gauntlet which is secured by a zip-fastener. The hand is attached to the gauntlet by two flat metal strips which are inserted into slots in the gauntlet. The hand can be detached and the various specialised appliances substituted.

Fingers and Thumbs

Hands are often a disappointment to patients who have not visualised the limitations. A strong and light hand of natural appearance is made from certus glue and muslin. Usually the thumb only is movable, with a spring which will hold light articles between it and the index finger. The fingers are fixed in a half closed position, and are useful for carrying articles, *e.g.* a small suit-case. Other hands also used for appearance have the joints of the fingers articulated so that they may be set in any desired position of flexion. These are not of much use for working purposes. Several types of mechanical hands are in use. When they are used by experts a wonderful performance can be given; most patients find that these hands are too heavy for comfort, and require too much force to operate the mechanism; the digits have articulated joints, and mechanism which enables them to be closed and opened. The motive force is supplied by movements of the upper arm or shoulders from which thongs or cables pass to the mechanism in the hand.

Because of the limitations of the artificial hand for manual work, appliances for use in place of the hand have been devised. The old type of hook is still used for some work, but many more useful appliances have been devised for particular occupations, *e.g.* the electrician has quick grip pliers, the carpenter has tool holders, the gardener has spade grips. Many of these are in the form of specially designed vices: they enable a more firm grip to be taken of the tool or other article than is possible with artificial fingers.

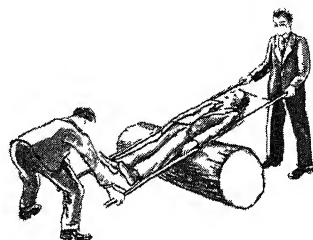
At Roehampton and at limb fitting centres in the provinces, classes of instruction teach patients how to make the best use of their artificial limbs. It is important that adequate instruction be given to the patient immediately after the limb has been supplied, and before bad habits are acquired.

Artificial Respiration. Method of restoring respiration to the asphyxiated. In chronic cases a breathing machine may be used; in acute cases, such as drowning or suffocation by gas, there is not a moment to lose. After one minute without oxygen, consciousness is lost; after two minutes respiration ceases and vasomotor failure follows. The heart muscle is extremely susceptible to absence of oxygen, and the flow of blood to the organs ceases rapidly, this ending in death.

Schafer's method should be started at once. The patient should be turned on his face, the mouth being cleared of mucus. The operator kneeling over him should place his palms in the lumbar region of the patient's body, alternately applying and relaxing pressure. This should follow the rhythm of breathing, each movement taking about five seconds to complete. The application of pressure drives up the abdominal organs against the diaphragm and causes expiration of air from the lungs. Relaxation of pressure allows the organs to return to place, followed by the diaphragm, thus causing inspiration of air. A variant is known as Sylvester's method.

A third method proved its value in the Second Great War. Eve's method requires some sort of stretcher balanced on a fulcrum, such as might be improvised by a door balanced on a barrel. (Schafer's method must be started while this is arranged.) The patient is rocked at an angle of 45°, four seconds head down, three seconds

feet down; the mechanics of the abdominal organs and the diaphragm are the same as in Schäfer's method. In the head down phase



Artificial Respiration. Eve's method designed to promote blood flow

blood drains out of the legs and abdomen into the heart, and the flow of arterial blood to the head is facilitated.

Artificial Silk. Material having in varying degree the qualities—sheen, lustre, strength, etc.—of natural or “spun” silk. Cellulose (*q.v.*) derived from wood, cotton, or similar natural materials is treated chemically and physically to render it soluble and viscous; it is then squirted through a small orifice to produce a continuous filament which, after further treatment, can be spun into yarn. In a similar process the viscous material is drawn into a fine thread. The name rayon (*q.v.*) has come into use in Great Britain for artificial silk in general. Besides natural cellulose certain synthetic substances are used for producing textile materials of this class. See Nylon; Silk; Viscose.

Artigas. Extreme N. department of Uruguay. Its area is 4,390 sq. m.; it is bounded W. by the Uruguay river and E. by Brazil, and is traversed by two rlys. From its extensive forests quebracho (*q.v.*) is obtained. Artigas is the capital. Pop. 55,748.

Artigas, José GERVASIO (1764–1850). Protagonist of Uruguay in the revolutionary period. Born at Montevideo, June 19, 1764, he was descended from a family of the first Spanish settlers. In the revolution of 1810 Artigas took a prominent part, and soon became the rallying point of all his countrymen, who were resolved to be freed equally of the Spanish and the Portuguese yoke. His life was one long struggle for the independence of his native state. He died in Paraguay, Sept. 23, 1850, after an exile of thirty years. His remains lie in a tomb in the cemetery of Montevideo, and his name is honoured through out the republic of which he was the pioneer. See Uruguay: History.



Artificial Respiration. In Schafer's method the ribs are alternately compressed from behind (2) and released (1), this last causing chest expansion

ARTILLERY: GUNS AND ACCESSORIES

Lieut.-Col. C. E. Tumber, T.D., R.A.

An account of the several ways in which artillery is used in offensive and defensive warfare, including a description of typical light and heavy guns. See also Anti-Aircraft Weapons; Breech Mechanism; Guns, Naval; and under Ammunition; Armoured Vehicles; Rocket Gun; Royal Artillery; Strategy; Tactics; Tank, etc.

In modern armies the artillery consists of units equipped with heavy weapons capable of firing at distant targets. The instruments provided differ with the nature of the target to be engaged, and are classified according to the function they perform, e.g. rangefinder, plotter, predictor. Both wireless and line telephony are used to transmit orders and reports so that a large number of guns can be centrally controlled when necessary. Mobile units have sufficient vehicles to tow the guns and carry personnel, instruments, ammunition, and stores. Static units hold the necessary stocks of ammunition in a dump or magazine.

The basis of organization is the gun detachment, or number of men required to operate one gun in action, which varies from two or three up to 15 or more. Tactical and technical considerations then determine the number of guns which should normally be employed as a unit, together with the instruments, ammunition, communications, and transport required.

Three Types of Artillery

The type of target to be engaged has such a great influence that British artillery is broadly divided into the three groups, field, anti-aircraft (A.A.), and coast. The artillery regiment (normally commanded by a lt.-col.) is equipped and trained to deal with targets of a given type. It is divided into batteries, which are further subdivided into troops or sections. In mobile regiments the troop is usually the smallest self-contained fire unit. The typical example is a troop of 25-pounder field guns. The four guns are spread over a frontage of about 100 yds., but are individually sited and camouflaged. The gun position officer (G.P.O.) passes orders through a microphone connected to a loud-speaker at each gun. For safety the guns are kept out of sight of the enemy, and a separate observation post (O.P.) is therefore established. The troop commander is usually the observing officer and passes back his orders to the G.P.O. by wireless or telephone line. The transport consists of vehicles which tow the guns, carry ammunition, G.P.O.'s equipment, O.P. equipment, rations, etc.

Two such troops constitute a battery, and the battery command post is connected to each G.P.O. by wireless or line. In addition the two G.P.O.s are connected by a separate link line.

The three batteries forming a regiment are similarly linked. In an emergency individual guns can engage targets with their own sights, and each post is organized for all-round defence.

The normal object of field artillery is to assist in a land battle, primarily by direct support of the infantry. Examples of ordinary targets are enemy known to be forming up for attack, concentrations of transport, mortars, and of installations generally.

For destruction, accurate shooting is necessary, but it is sometimes required merely to hamper the enemy and prevent effective use of his weapons. For this purpose intensive neutralising fire for a comparatively short critical period, or a smoke screen, may be sufficient. Concentrations produced by a large number of guns shooting into a limited area have often been effective.

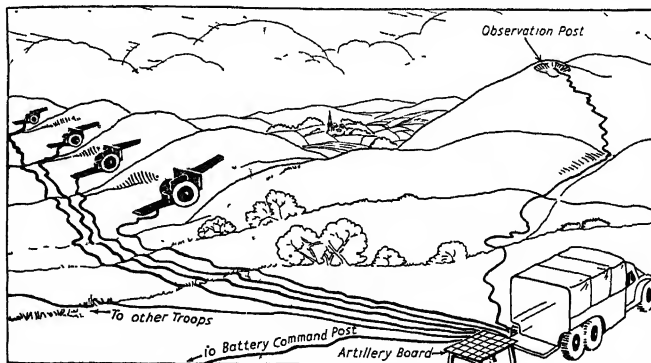
The rôles assigned to medium and heavy regiments are similar, and the lay-out in action almost identical. The guns being larger, heavier, and therefore less mobile, are sited farther back and are more often used to engage enemy batteries (counter battery fire), fortified posts, etc. Survey regiments assist in linking up on a broad front by locating key points, and fix the positions of

enemy guns by means of their flash and report (flash spotting and sound ranging). A few super-heavy guns transported by road or rly. are sometimes employed for a special purpose, such as the attack of heavy concrete defences. Anti-tank regiments are now used in large numbers. The need to obtain an immediate hit with penetration limits engagements to a range of about 1,000 yds. No separate O.P. is required, for guns as a rule are individually sited and controlled according to local conditions.

Anti-Aircraft Guns

There are two distinct types of anti-aircraft artillery designed to meet the two normal forms of attack. A large vulnerable point (V.P.), such as a base port or industrial area, is most likely to be attacked by high-flying bombers which obtain accuracy by holding a steady course for an appreciable time before bomb release. Heavy A.A. guns are therefore organized in a defensive belt outside the V.P. to prevent accurate bombing and, if possible, to damage or destroy raiders. Each gun-site in the belt consists of a command post manned by a G.P.O. with the guns grouped round it. Static equipment has reached a stage where, in action, the human element has almost been eliminated. It is hardly necessary to do more than keep the guns supplied with ammunition and use a button to start and stop firing. The equipment of mobile heavy A.A. regiments necessarily sacrifices a proportion of these refinements.

A small V.P., such as a bridge or an individual factory, is generally attacked by low-flying aircraft of dive-bomber or fighter-bomber type. The general defensive lay-out is similar to that just described, but the nature of the



Artillery. Diagram showing the disposition of a troop of 25-pounder field guns over a frontage of about 100 yds.

target calls for totally different guns—light handy weapons to swing round and to have the highest possible rate of fire.

Coast artillery is the main defence of naval bases and ports against sea attack. As with A.A., the object is primarily deterrent; the ideal is to make the defences so strong that the enemy is unwilling to risk an action. Close cooperation with the Navy is essential because fixed naval defences, e.g. minefields, booms, and anti-torpedo nets, are generally installed. Each "fortress" is considered on its merits and an individual defence system is built up from standard components. The typical component is a battery of two or three guns, often mounted in a "fort" and having its own searchlights.

When the guns are fired as a unit, a single O.P. is used for control of lights, observation, and adjustment of fire. Unified control of lights and guns is essential, for attempts to enter a harbour are most probable at night, and guns fire at targets selected by the lights. Alternatively each gun may engage a different vessel with the aid of its own special form of sight. For long-range engagement of battleships and cruisers a heavy weapon is required to fire a large projectile capable of penetrating and doing damage. The fact that the target is moving involves a set of instruments comparable with those provided for A.A., but its limited speed enables adjustment of fire to be carried out so long as it is done quickly. All mountings are static, and this makes it easier to obtain accuracy and a high rate of fire for the size of gun.

Characteristics of Artillery

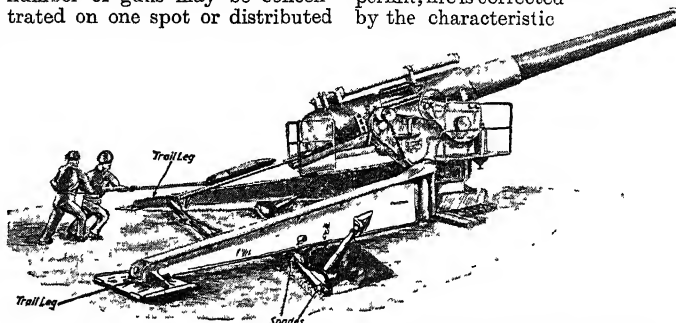
The typical characteristic of artillery, whatever its nature or purpose, is that it shoots at a given type of target from a greater range than other weapons. For example, the ordinary field gun may normally engage the enemy at a range of some 5 or 6 m., in contrast to the infantry, who must approach, or allow the enemy to approach, within a few hundred yards. Bombers flying at 30,000 ft. may be engaged by heavy A.A. guns or by fighter aircraft which rely on superior speed to get within short range. Coast artillery may fire on attacking warships up to some 20 m., but light naval craft must close before using their armament.

The actual weapon is the projectile, whether shot or shell. The

gun is simply a means of directing it and giving it the necessary speed. A large projectile is usually required, and this necessitates a comparatively heavy equipment. Thus although the gun itself is not as mobile as infantry, aircraft, or ship, the projectile may rapidly be fired to hit any point within a large area, so that artillery is extremely flexible. No time is lost in closing with the target; and, given the communications necessary for control, the fire of a number of guns may be concentrated on one spot or distributed

zone of a weapon depends mainly upon the range at which it is used, the fact that the gun is essentially a long-range weapon leads to unavoidable dispersion, which must often be taken into account.

A separate difficulty is that the centre of the zone may often be displaced from the target. This is due to errors which have a constant effect, such as an incorrect figure for the range to the target. Where observation is possible and other circumstances permit, fire is corrected by the characteristic



Artillery. The 240-mm. American howitzer, a modern super-heavy weapon

as required by changing conditions.

These advantages can be exploited only if it is possible to locate the target, allow for the various factors which may change from time to time, and then lay the gun so that the projectile arrives quickly enough and with sufficient accuracy for the purpose in hand. This process, known as fire control or fire direction, necessitates a great variety of instruments to perform the three operations involved for different targets in different circumstances.

The human element is necessary to select the target, decide and put into practice the measures to be taken, and in general observe and correct results. This procedure is gunnery. No weapon or instrument can ever be completely free from error, and the result is some degree of scatter of rounds over a zone of dispersion at the target. A large number of factors affect the zone, e.g. small irregularities in weight of projectile or charge, temperature of ammunition or atmosphere, barometer, wind, etc. Errors may be minimised by careful inspection after manufacture and by corrections in the field, but the complication and delay involved must be weighed against the degree to which accuracy is essential. The importance of the zone in artillery shooting arises from its size compared with the target. Since the

artillery process of ranging. The position of each round or group of rounds is observed, and the corrections deduced are ordered to the guns.

The only way of obtaining any degree of success without observation and correction is to employ "predicted fire" or a predicted concentration. This means using the most accurate methods available in order to minimise errors, and a large number of guns to cover a big proportion of the zone. The method is used by field artillery to obtain surprise and immediate results. At the beginning of an attack, predicted fire might be put down on certain enemy batteries and a number of guns would concentrate on each. In heavy A.A. the prediction is mainly concerned with the movement of the target, and time is so short that a special instrument must be employed to make the calculations. Each predictor controls a number of guns, so that the system is basically the same as that used by field artillery.

Although the basic features of artillery are common to all categories, the individual types of gun and instrument differ greatly in construction. The target to be engaged, in addition to governing the nomenclature and organization, has a fundamental effect on design. Many of the desirable features are mutually antagonistic,

and every design is therefore a compromise. A given problem can often be solved in several different ways, and a large number of special and experimental types of gun have been produced. The following examples have been selected to illustrate the main features of standard weapons. The first is American, the remainder are British.

The 240-mm. (9·5-in.) American howitzer is a modern super-heavy weapon. It travels on two separate transporters and is assembled by a mechanical crane which may also be used to prepare the ground. It fires a 360-lb. projectile some 25,000 yds. (about 14 m.) and the construction, which enables the legs of the "split trail" to be opened out on the ground, gives a relatively large traverse, or horizontal sweep, without danger of tipping. The gun may be elevated to an angle of 65° with the horizontal and all the mechanism is hand-operated. The heavy and medium series lie between this and the next example.

British 25-pounder Gun

The 25-pounder is the standard weapon of British field regiments. Its shell can be fired to about 13,000 yds., and it can elevate to 45°. It is strong in construction, which enables the trail to be quick to bring into action, but the top traverse is limited to a small angle. Greater changes in direction are obtained by moving the trail. The gun is fitted with a muzzle brake to reduce the effects of recoil. High explosive shell, smoke shell, and armour-piercing shot are provided. The propellant charge is contained in a separate brass case, and has several detachable portions. A round may be fired to hit a given point either with a high charge and flat trajectory for general purposes, or a small charge and curved trajectory for dropping a round into a trench or clearing an intervening obstacle.

The artillery board is used with all types of field weapons for recording target positions and obtaining the data for shooting. The board has a surface prepared for drawing, and is marked with a grid of squares. Any potential target or other

point can be plotted. The range scale, which pivots at the gun position, is swung over to intersect the required target, and the range from gun to target is read off. The angle between the direction of N. and the direction of the target is called the bearing to the target, and this is read on the scale provided. When the target is not visible from the gun, a suitable object is chosen as aiming point, and its bearing may be found by magnetic compass or survey methods, for which purpose a director is carried. The difference in direction between aiming point and target is the difference between these two bearings. The gun elevation corresponding to any range is given in the range table, and is applied by a system equivalent to depressing a bubble tube through the requisite angle. Levelling the bubble raises the gun to the correct elevation. Should the gun move on firing, it is only necessary to bring the telescope back on the aiming point and level the bubble.

An anti-tank gun must wait until the tank comes within very short range, otherwise the tank is liable to destroy the gun immediately it gives away its position by firing. Guns are generally sited to one side of the expected line of approach so as to hit the tank on the thinner side armour and to be less conspicuous when they fire. Concealment is important, and the 17-pounder is very low for this reason. The split trail gives a top traverse of about 45°, which makes it possible to follow a tank over a reasonable arc without the movement associated with lifting a trail. The long, thin high-velocity gun is fitted with a muzzle brake, but still has a powerful recoil, which necessitates long trail legs for steadiness. The breech has semi-automatic action, the empty case

being ejected during recoil and the breech remaining open until another round is loaded, when it is closed by a spring. This gives quick loading and the best chance of a second shot.

Two further types must be mentioned. In both the gun is intended to fulfil a normal purpose, but the general design sacrifices certain desirable qualities to attain exceptional mobility. The 3·7-in. howitzer is a "pack" weapon, i.e. it is extremely light and can be rapidly dismantled into several portable loads. It is an old design used by mountain batteries with mule transport, but it revived in importance when a demand arose for a weapon which could be loaded into gliders and aircraft. Its total weight is about one-third that of the 25-pounder. Its elevation is 40°, and it fires a 20-lb. projectile to 6,000 yds. Thus there is a very great saving in weight, but the whole performance is reduced—especially the range. Time into action is, of course, much greater, but a 25-pounder could not even approach many of the positions which may be used by this type of gun.

S.P. Gun for Land Warfare

Efforts to improve mobility for normal land warfare naturally led to self-propelled (S.P.) mountings. The S.P. gun has the cross-country performance of a corresponding tank and can usually outrange it, but if the tank approaches from the side the gun is often at a disadvantage. Thus the tactical handling is different, and the differences in design may be summarised by the statement that in an S.P. mounting the performance as a gun takes precedence over the performance as a tank. Tracks quickly wear out, especially on roads, so that although the S.P. mounting is very mobile in the battlefield, it must be loaded on to



Artillery. British 25-pounder, standard weapon of field regiments, which can be used as an anti-tank gun. It has great mobility, and can be turned inside its own length

a special transporter if it is required for a long journey.

The 3·7-in. A.A. gun is typical of the heavy A.A. class designed to engage raiders up to some 30,000 ft. or more. The difficulties of obtaining a direct hit are so great that a time fuse is used to burst the shell at the instant it is calculated to reach the target. The radius of burst is of the order of 60 ft., but the further difficulty of accurate fuse setting is introduced. Deterrent effect is increased because bursts can be seen by the enemy air crews even when they occur at a harmless distance. All-round traverse is provided and the elevation limit is about 80°. To keep the mounting reasonably low and simplify loading at high angles, the gun elevates about a point well to the rear at the breech.

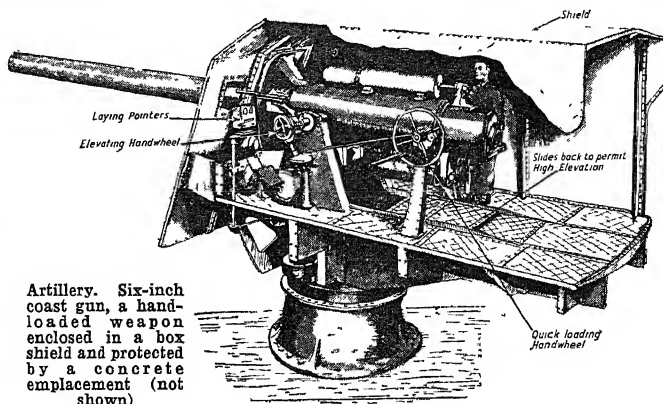
The static type is balanced by a large counterweight and the mobile by springs which make a lighter arrangement. Some form of range-finder gives information of the target's present position, but if the gun were fired to hit this point the plane would have travelled forward some two miles by the time the shell burst. It is essential to lay the gun on the "future position," i.e. where the target will be when the shell arrives, so that as the plane travels forward the shell travels upwards and they both arrive at this point together.

Use of the Predictor

The predictor is a device which receives the present position, makes corrections to allow for the travel of the target, then passes the future position to the guns. The information is transmitted by means of electrically controlled pointers which show bearing and elevation for the gun and setting for the fuse, which must be applied at that instant in order to hit the target which is due to arrive in, say, half a minute.

On the mobile mounting a mechanical pointer is fixed immediately behind each electrical pointer and geared to the gun in such a way as to indicate its position. So long as the layers operate the traversing and elevating gears to keep each mechanical pointer coincident with its electrical pointer, the gun is laid. The whole process is continuous, but the pointers move fast and change in speed, so that laying is not easy.

Fuse setting must be extremely precise, for the object is to burst the shell at an exact point on its flight when it may still be travelling at, say, 2,000 ft./sec. and an error in setting equivalent to only



Artillery. Six-inch coast gun, a hand-loaded weapon enclosed in a box shield and protected by a concrete emplacement (not shown)

one-tenth of a second will cause a burst 200 ft. from the target.

Hand setting was superseded by fuse-setting machines. These, though quicker and more accurate, still set the fuse before loading began, so that any irregularities in the time taken to remove and load the round caused errors in the fuse. Later machines are completely automatic. Immediately the fuse is set, the round is swung over and rammed into the gun, the breech closes and the gun fires—all within a matter of seconds. The high rate of fire attained in this way helps to compensate for the impossibility of any normal ranging. The policy adopted is to develop the maximum volume of fire and rely on the instruments. To this end the predictor is designed or adapted to control a number of guns. The predictor assumes that the target will hold a steady course and speed, which assumption is justified for a normal heavy aircraft about to drop bombs.

Light A.A. weapons are typified by the 40-mm. Bofors, originally of Swedish design, adopted by Great Britain and other countries. The main structure is similar to that of the 3·7-in. A.A. and it is a mobile handy mounting. The loading mechanism is operated by the force of recoil, and, though complicated, gives little trouble. If the firing pedal is held down, the gun will fire approximately one round per sec. as long as ammunition is supplied. Alternatively, single shots may be fired. The very short time of action rules out any possibility of setting fuses, so that it is necessary to obtain a direct hit. The high-explosive projectile is fitted with "tracer" to make it visible in flight, but although this has some deterrent effect, considerable ex-

perience is required before it can be used for correction. Conditions change so rapidly that anticipation is necessary. The rates of traverse and elevation often amount to 30° or 40° per sec., so that it becomes impossible to follow when a plane in level flight passes almost over the gun. German dive-bombers proved easy targets when the guns had been sited to be roughly in the same direction of dive as the V.P.

The Six-inch Gun

The 6-in. gun has for many years been a standard weapon in coast artillery; on the modern mounting it is capable of elevating to 45°. The working parts are enclosed in a box shield and the whole installation is protected by concrete. The maximum range is about 26,000 yds., and the 100-lb. shell will sink a destroyer and damage larger warships. Only one propellant charge is fired, but several types of projectile are available in the magazine for use against different classes of vessel. Selection is based on recognition of the vessel and knowledge of the factors involved. The gun is hand-loaded, and, if it is to fire at high angles, it must first be brought to the loading position, for which purpose a special handwheel is used.

Hand laying is satisfactory against ships, and pointers similar to those described for the 3·7-in. A.A. are provided. Larger mountings have power-loading owing to the greater weights involved. Great accuracy is obtained from the steady mounting and from the refinements which are incorporated, e.g. mechanism to ensure automatically that all guns of a battery are concentrated, i.e. laid on the same point.

As in the field, a grid system is used, and every O.P. has a chart

similar to an artillery board for pointing out targets. But the static nature of the defences makes possible survey, mechanism, and transmission lines which enable any range-finder to serve any battery. The present position of the target is passed with reference to the grid and any battery concerned may apply this to an instrument on the lines of a mechanical artillery board so as to obtain the bearing and range for its own guns. The next step, as in A.A., is to allow for the movement of the target. This is done by the fire direction table, which may be used in the same way as a predictor to follow a range finder, or alternatively may be set to the course and speed of the ship, when it will continue to evolve the data required to hit such a ship whether there is any information coming in or not. As in A.A., the instrument assumes that the target will hold a steady course and speed. There is, however, the fundamental difference that when the ship makes some unexpected turn, observation of the vessel itself and of the fall of shot enables corrections to be applied. Results on the water take precedence over purely instrumental calculations.

Development of Searchlights

In short-range night actions the searchlights are directed from the O.P. by electrical remote control, and a lamp has been developed which gives six hours continuous light, automatically changing its own carbons as they are burnt. Shooting is possible up to about 3,000 yds. in average weather and automatic sights effective to about this range are fitted to the guns. These are characteristics of coast artillery, and depend upon the fact that the height of the gun above the ship is always known. The sighting telescope and the gun are mechanically connected, and the telescope is easily traversed to the direction of the ship.

For dealing with fast targets such as motor torpedo boats the 6-pounder twin is used. The conditions of action are generally similar to those just described, but it would be impossible to follow many fast, turning targets with searchlights; so an illuminated area, consisting of a number of fixed dispersed beams, is used. Ranges are likely to be under 2,000 yds. and the mounting with both semi-automatic guns firing will develop over 70 rounds per minute. Mountings operate individually on a pre-arranged

distribution of fire scheme and are provided with an automatic sight in case the normal control should fail. The unique feature is that corrections move the pair of guns relative to the mounting, so that the layers follow smoothly and the guns can be swung in the necessary direction without causing any disturbance to them.

At the beginning of the First Great War artillery was mainly used to fire shrapnel shell at targets in the open. This was a legacy from the veld conditions of the South African campaign. When trench warfare set in, more and more high explosive shell were used for demolishing earthworks. There was a clear distinction between gun and howitzer which has now almost disappeared. The gun was a weapon of limited elevation which fired shrapnel with a large charge, so that when the shell burst the bullets still had sufficient velocity. The howitzer could obtain considerable elevation and drop a high explosive shell into a trench. Modern field weapons, with their variable charges and high limiting elevation, can perform either task. The term gun or howitzer now simply indicates the predominant characteristic. The functions of shrapnel have been largely taken over by "air-burst H.E.," i.e. high explosive shell with a time-fuse burst at the proper height above ground.

The static conditions of trench warfare led to great developments in the technique of indirect fire. The forward O.P., better communications, improved survey methods, and meteorological information all helped towards accurate coordination of many guns. From this grew the "barage" (*q.v.*).

Mechanical Tractors

Between 1918 and 1939 tractors replaced horses for drawing the guns, and this removed the upper limit imposed on the weight of field guns by the capacity of the normal horse team. During the same period still more elaborate methods of survey, communication, and control were evolved, based mainly on static warfare.

The rapid German advances of 1940 presented the artillery with very different conditions. Tanks frequently appeared from flanks or rear close to the guns, and parachutists, dive-bombers, etc., caused added difficulties. Methods were rapidly overhauled, and there was a temporary swing in the direction of short-range direct fire by individual guns. The

modern system is to prepare positions in the first instance for all-round defence and direct fire, then to link up for centralised control and indirect fire as opportunity offers. Many more wireless sets are available, and communication procedure has been simplified and standardised so that a large number of guns can be effectively brought under central control. The ponderous barrage has been replaced by flexible massed artillery fire.

Use of Radar

In the technical field the advent of radar (*q.v.*) led to many revolutionary changes. The device is in essence a wireless method of obtaining the position of a target. Technical developments enabled radar sets to fix targets with sufficient accuracy for the guns. A.A. and coast artillery were already equipped with the necessary calculating instruments, and their capabilities had been limited mainly by reliance on optical range-finding and searchlights. Many effective actions in poor visibility or darkness were fired by A.A., and results were further improved by developments in technique, predictors, and guns. Application of radar to searchlights and night fighters contributed in making night raids almost as unprofitable as the earlier day raids had become. Predicted concentrations fired by coast artillery almost invariably turned back groups of light German mine-laying craft; and still better sets, which could locate the splash of a shell with reasonable accuracy, enabled a series of long-range night actions to be carried out with radar range-finding and observation. Numerous radar sets are now included in standard A.A. and coast equipment.

A notable revival is the rocket principle. Many weapons are in service which fire a shell attached to the nose of a rocket, and some may be regarded as being of artillery type. Rockets may be fired from very simple rails or guides, so that the projector is very light and easily made, but they are inaccurate and bulky. Thus a very heavy momentary burst of fire can be produced, provided no great accuracy is required, and a large preliminary effort can be made. The transport and labour involved in assembling the ammunition on the spot may present some difficulty. Rockets are visible from the air throughout their flight and one round can be avoided, but if enough are fired

together there is a prospect that in avoiding one the raider will fly into the track of another. Projectors have been fitted to craft supporting a landing and to assault-tanks. In the latter case the projector is usually discarded after firing and the tank proceeds unencumbered.

Many types of gun have been used for secondary tasks. The 3·7-in. A.A. mobile makes a useful field and anti-ship weapon. Its great elevation has on occasions enabled it to engage targets which were impossible for other guns. Units are trained in the special procedures, and the gun is fitted with extra sights. The 40-mm. has been used as a super-heavy machine-gun and against small vessels. In the desert a periodic round of tracer fire over the heads of advancing troops proved useful in maintaining direction by night. Coast guns are normally given selected land targets and provided with special ammunition in case there is no sea target during a land raid or invasion, but their primary task and concrete cover curtail the possibilities. They have also been used to fire concentrations against minelaying aircraft operating over harbours.

Artillery School. Institution for the technical training of the personnel of artillery units and the elucidation of gunnery problems. The first artillery school was established by the Venetians in the 16th century. This was followed by schools at Burgos and in Sicily founded by Charles V. A practical school was founded by the French in 1675, and a theoretical institute at Douai in 1679.

The chief British school for training artillery officer cadets used to be the Royal Military Academy, Woolwich, the oldest military educational establishment in the U.K., founded and endowed by a warrant of George II in 1741, though it was in existence before then. A school of gunnery was at Shoeburyness, this place being chosen because of the scope afforded for artillery practice by the immense area of the Maplin sands at low water. A start was made there in 1849, when restrictions prevented the necessary firing being done at Woolwich. The experimental establishment, which conducts the proof tests of ammunition and guns, and makes practical tests of new weapons, occupies this site. The school of artillery embraces the whole range of artillery science, including field, medium, heavy, and anti-tank

guns, anti-aircraft and coast artillery weapons. The introduction of radar into artillery fire control brought highly technical equipment into the hands of artillery officer and man alike. The school of artillery, at Larkhill on Salisbury Plain, is the centre of teaching of the operational and tactical handling of all artillery for the field force. In addition there are a school of anti-aircraft artillery and a coast artillery school. At each, general instruction and special courses are given to selected officers and n.c.o.s to fit them as instructors in gunnery.

Artiodactyla (Gr. *artios*, even; *daktylos*, finger). Term applied to that order of hoofed mammals, such as cattle, deer, and pigs, which possess an even number of toes, in contrast with horses, tapirs, and rhinoceroses, which have an odd number. They have cloven hoofs, the result of the third and the fourth toe being nearly equally developed and placed symmetrically on each side of a vertical line dividing the foot. There are never more than four toes altogether, and the animals stand on the toes alone, no other part of the foot touching the ground. Animals of this order often have horns set in pairs on the head, whereas in odd-toed animals the horn, where it exists, as in the rhinoceros, is nasal. Many of the Artiodactyla have a complex stomach adapted for rumination; this the odd-toed animals never possess.

Artists Rifles. British army unit. Founded as a volunteer corps in 1860 by Lord Leighton and other artists, it was originally recruited from artists and sculptors, and through constant contact with regulars quickly became proficient, excelling especially in bayonet fighting. The uniform was



Artists Rifles badge

grey with black and silver facings. A contingent fought in the S. African War. Mobilised on the first day of the First Great War, the Artists went to France, Oct., 1914, and were at once established by Sir John French as a training corps for officers in the field. In 1915 the regiment was reorganized as an officers' training corps, and the 2nd battalion was created by special order a school of instruction for officers. This school was the pioneer of officer cadet battalions, and its syllabus was adopted as a

model. It supplied over 10,000 officers. In 1917 the 1st battalion became part of the 63rd (Royal Naval) division. During the war eight V.C.s were won by the Artists, and about 2,000 members died on active service. In 1937 the Artists Rifles became officially an officer producing unit, in 1939 an O.C.T.U., and in 1947 a Special Air Service unit, the only one of its kind in either the regular or the territorial armies. See Special Air Service.

Art of Fugue, THE. Musical work by J. S. Bach (*q.v.*). Left unfinished at his death in 1750, it was the same year completed, edited, titled, and published by his son Karl, but not too skilfully. It consists of some 17 fugues (including two pairs of "mirror" fugues in which every part can be inverted), two 4-part canons, and 18 organ preludes; including Bach's final composition, dictated after he was blind. Long a puzzle to scholars, the work as orchestrated by a German student in 1924 was performed at Leipzig in 1927 and in London in 1932.

Art of Love (*De Arte Amatoria*). Poem by the Roman poet Ovid. It professes to give instruction in the art of winning and preserving woman's love. Though cynical and shameless to a degree, its brilliant wit and shrewd insight into human nature, combined with consummate versification, stamp it as a work of genius.

Artois. One of the provs. into which France was divided before the Revolution. It was the district around Arras, its capital, and was for a long time ruled by the counts of Flanders. In 1180 the kings of France obtained it, and for many years it had its own counts, who were vassals of the French king. In the 14th century it passed to Burgundy, then to Austria, and was recovered by France in 1659. When at the Revolution France was divided into departments Artois was included in that of Pas-de-Calais. At present the name is used in a vague sense for the district, as Wessex or East Anglia is used in England.

Artois, BATTLE OF. Operation of the First Great War, May-July, 1915. It was conducted mainly by the French, with British assistance. To prevent the dispatch of German troops to Russia, then hard pressed by the enemy, Foch was ordered to start an offensive N. of Arras. The main attack was designed to reach the coalfield of Lens. Here the defensive works comprised underground galleries,

concrete and steel machine-gun posts, and elaborate systems of mines and barbed wire. The most conspicuous point in the defences was the hill of Notre Dame de Lorette, 500 ft. To the S. of it lay the fortified villages of Ablain, Carency, and Souchez, the cellars of which had been connected. The Germans under Prince Rupert held the direct road from Arras to Béthune and threatened the roads to Aire and St. Pol.

The date fixed for the French attack was May 9. It was preceded by a demonstration of the British in force against Aubers Ridge. Then the French artillery of some 1,200 guns opened the most violent bombardment witnessed to that date. This inflicted severe loss, but did not destroy the fortified cellars or much affect the maze of underground works. At 10 a.m. the infantry assaulted, and before noon had advanced 2 m. La Targette was stormed and a house-to-house fight started in Neuville-St. Vaast and Carency; but then the fighting assumed the character of a fierce trench battle.

On May 10 the French reached the high ground near Notre Dame de Lorette, but were unable to establish themselves under the terrific fire. During the night, however, the important spur running from the height towards Ablain was captured. Next day the cellars of Carency were stormed and the large church of Notre Dame de Lorette was taken after some of the most desperate fighting of the war. By nightfall most of Ablain was in French hands. By May 13 the total of unwounded prisoners was 5,000, and by the 15th most of Neuville-St. Vaast had been carried. But with its fall the French found their advance held up by the huge system of works to the S.E. known as the Labyrinth; and for another week the Germans on the plateau of Notre Dame de Lorette still held out.

The battle for the Labyrinth took up the rest of May and all June; with only slow and painful gains, but step by step, the German position was captured. The closing stages of the battle in the second week of July were marked by monotonous trench fighting which made the severest demands on skill and determination. Success was only partial, for the break-through at which the French aimed was not achieved. The Germans at this date were too strong in numbers and morale to be easily shaken; their works too

formidable to be overcome without a heavier artillery and such instruments of assault as the Allies afterwards developed in the tanks.

Arts. Term applied to certain branches of study. In the Middle Ages, when universities were founded, instruction was classified in faculties, one of these being that of the arts or liberal arts a term inherited from the schools of the Roman Empire. Plato and Aristotle had already distinguished the liberal arts, calculated to promote literary and ethical progress, from the practical, concerned with what is useful. Philosophy stood by itself as *the* liberal art. The Romans also put forward several lists, but about the 5th century the arts were recognized as seven—grammar, dialectic, rhetoric, music, arithmetic, geometry, and astronomy, these representing the sum of human learning. Gradually as the nature and scope of education widened, the meaning of the term changed; it now includes, generally speaking, classics, philosophy, and modern languages and literature, while in some universities mathematics is still one of the arts. In most universities arts is the senior faculty, and possibly for that reason new branches of study, e.g. accountancy, are included therein, unless there is a faculty of commerce.

Arts, ROYAL SOCIETY OF. For details of this learned British society see Royal Society of Arts.

Art Sales. Disposal of works of art generally by auction or through the hands of art-dealers. The varying prices realized afford criteria as to the value or popularity of pictures and other works of art from the collector's point of view, and also serve to indicate changes in taste. Early in the 17th century London began to attract the choicer pictures, which had formerly gone to the marts of Amsterdam, Antwerp, and Paris. Christie's (*q.v.*) became and remains the most famous mart.

When a collection is to be sold, the auctioneer is called in to report, and, should terms be arranged, he carries through the whole transaction, including cataloguing, and receives a commission. The principal sales being attended by the leading dealers, many of whom act for wealthy amateurs, pictures of commanding merit fetch their commercial value, while, *per contra*, those which have not stood the test of time are appraised accordingly.

To cite a few of the more remarkable sales at Christie's,

Joseph Gillott's collection (1872) fetched £164,530; Sam Mendel's (1875), £101,134; Baron Grant's (1877), £106,262; George McCulloch's (1913), £136,859. In the Mendel sale, W. P. Frith's Dinner Party at Boswell's Lodgings fetched £4,567 10s., the highest price ever made at auction during the painter's lifetime, though it dropped to 3,050 gs. at the Grant sale. On the second day of the William Graham sale (1886) a Nocturne by Whistler, which had occasioned Ruskin's diatribe, was greeted with a hiss and went for 60 gs.

One of the most famous art sales ever held was when the Hamilton Palace treasures were sold in 1882. They yielded £397,562. In July, 1919, Sir Joshua Reynolds's portrait of Mrs. Siddons as The Tragic Muse was bid up to 52,000 gs. at Christie's.

Changing prices as a record of changing taste became evident during the years between the First and Second Great Wars. In 1923, Millais's *The Eve of St. Agnes* was bought by Sir Edmund Davis for £1,575 at Christie's, but in 1942 this picture fetched only £630. Important sales included Lord Harewood's Italian renaissance pendant, known as the Canning jewel, reputed to be the work of Cellini, which was sold for £10,000 at Sotheby's. In 1937, 43 pictures, mainly Dutch, were sold for £53,000, and in 1941-42 the remaining works of Wilson Steer fetched over £10,000. In 1943 the great assemblage of works forming the Brady collections was sold for about £100,000 in New York. At the Plaza art galleries in New York, receipts amounted to more than £200,000 during 1943.

Possibly the most romantic sale at Christie's occurred on July 27, 1945, when the long-lost Rowlandson drawing, *A Night at the Vauxhall Gardens in 1784*, was auctioned. Acquired in a dusty condition by an astute buyer for £1, it fetched 2,600 gs.

Art Schools. For information on these, see Schools of Art.

Arts Council of Great Britain.

Organization founded to assist the arts and to encourage knowledge, understanding, and practice of them. Earl de la Warr, president of the board of Education, in Dec., 1939, suggested the scheme to Lord Macmillan, then minister of Information, and the latter, as chairman of the Pilgrim Trust, was instrumental in obtaining from the trust an initial grant

of £25,000. This resulted in the formation of an emergency committee for the Encouragement of Music and the Arts (C.E.M.A.), which began activities on Jan. 1, 1940. It was confronted with a twofold problem: (1) decentralisation of the arts because of wartime conditions—the blackout, transport difficulties, the evacuation of London by thousands of people; (2) the maintenance of high standards, notwithstanding abnormal circumstances. As far as possible C.E.M.A. worked through existing organizations. Where none suitable was available and there was important work to be done, special facilities were created. In April, 1940, the treasury granted a further £50,000 for its continuance, with the condition that C.E.M.A., which became the Council for the Encouragement of Music and the Arts, raised an equivalent sum from non-statutory sources. The Pilgrim Trust maintained its support, and for the next two years C.E.M.A. financed its work from both public and private funds. In March, 1942, the government, convinced of the success of the experiment, accepted full financial responsibility. J. M. (later Lord) Keynes accepted the chairmanship, the treasury's annual grant-in-aid was made on the vote of the board of Education, and the president of the board appointed members of the council.

In order to take music to factory canteens, hostels, and the general public in small towns and villages, a special concert organization was created, and at the request of the Y.M.C.A. many concerts were given before the troops in Y.M.C.A. canteens and clubs. The council cooperated with the British Council in providing concerts for members of Allied forces. Special productions of plays were toured for the entertainment of war workers in hostels and in the small industrial towns. Art exhibitions were taken, either directly by the council or through the British Institute of Adult Education, to provincial galleries and small towns that lacked gallery accommodation, and held in varied premises—institutes, halls, commercial showrooms, and churches. The council also worked in association with approved orchestras and theatre companies.

During 1944 nearly 8,000 concerts were given either by the council or by orchestras and concert clubs working in association

with it. These were attended by about 3,000,000 people. During the same period 60 different exhibitions were circulated through the country; and 25 associated theatre companies were responsible for nearly 200 different productions of plays, operas, and ballets.

Permanent Status

These wartime services created not only a vigorous and an intensified interest in the arts among all classes of people, but also the desire that it should be maintained and developed; and the government, in June, 1945, granted C.E.M.A. permanent status as the Arts Council of Great Britain. Its members are appointed by the chancellor of the Exchequer, after consultation with the minister of Education for England and the secretary of state for Scotland. Their aims are to develop the two chief sides of the work, also to pay increasing attention to the acquisition or provision of suitable buildings for the arts, especially where accommodation is either non-existent or insufficient. With headquarters at 9, Belgrave Square, London, S.W.1, the council has offices for Scotland at 29, Queen Street, Edinburgh, and for Wales at 34, Park Place, Cardiff.

Artsibashev, MIKHAIL MIKHAILOVICH (1878–1927). Russian novelist, of Tartar descent. Born Nov. 18, 1878, he began as a caricaturist, but turned to the writing of realistic short stories. Of his novels, which are equally realistic, *Sanine*, 1907, translated into English by J. Povolozky, 1915, shows his hatred of the social order of the time. The same revolutionary strain is evident in his other works, e.g. *The Breaking Point*, 1915; *Tales of the Revolution*, 1917; and *War*, 1918. He was imprisoned for two months in 1912 as a revolutionary, and after the Russian revolution fled to Poland. He died March 3, 1927.

Arts Theatre. London stage society, founded in 1927 as a theatrical and social club. At its premises in Great Newport Street, W.C.2, were given first productions of *The Lady with a Lamp* (R. Berkeley), After October (R. Ackland), Oscar Wilde (L. and S. Stokes), and *The Infernal Machine* (J. Cocteau). In 1942 Alec Clunes, taking over theatre and club with 250 members, formed the Arts Theatre group of actors to provide high quality entertainment at reasonable prices; he gave plays by Bridie, Chesterton, Drinkwater,

Farquhar, Masefield, Maugham, Pinero, Shakespeare, Shaw, and Sheridan; and by Bernard, Goldoni, Molière, Odets, O'Neill, Synge, and Quintero. A festival of English comedy was held in 1943 and one of English drama in 1945. Clunes then bought the 28 years' lease of the theatre, whose membership had risen to 11,000.

Aru or **ARRU**. Group of more than eighty islands in Indonesia. At nearest some 70 m. S.W. of New Guinea, they cover an area of 3,250 sq. m., and are separated by narrow channels. Low lying, with steep and rugged coasts, they are well wooded, and on the E. are bordered by coral reefs. They produce for export pearls, trepang, rice, maize, sago, and tortoiseshell. Dabbo, the chief town, attracts many traders. Pop. 18,139.

Aruba or **ORUBA**. Island of the Dutch West Indies. It lies off the entrance to the Gulf of Maracaibo, belongs to the colony of Curaçao, and has an area of 69 sq. m. It produces phosphates, guano, and aloes, but the chief industry is oil refining. The plant here and at Curaçao (*q.v.*) is among the largest of its type. There is a good deep-water anchorage, and tankers bring the crude oil from Venezuela. Early in 1942 the Netherlands government came to an agreement with the government of Venezuela by which the latter shared in the defence of Aruba and Curaçao. In Feb., 1942, both islands were shelled by a German submarine, and tankers in the vicinity were torpedoed. Pop. 39,318.

Arum. In botany, name of the plant popularly called cuckoo pint, lords and ladies, or wake robin (*q.v.*), native to Britain. The so-called arum lily is not a lily but a calla.

Arun. River of Sussex, England. Rising in St. Leonard's Forest, it flows, through a notable gap in the S. Downs, W. and S. for 36 m. to the English Channel at Littlehampton. It is navigable for small vessels to Arundel.

Arundale, SYBIL (b. 1882). British actress. She was born June 20, 1882, and made her first appearance on the London stage in a Drury Lane pantomime, 1891, subsequently playing in musical comedy. A versatile actress, she appeared later in farce,



Sybil Arundale,
British actress

comedy, and drama. In 1925 she achieved a striking success as Gina Ekdal in Ibsen's *The Wild Duck*, and in 1928 was responsible with Herbert Jay for the building of the Embassy Theatre (*q.v.*). She was a frequent broadcaster in radio plays.

Arundel. Mun. bor. of Sussex, England. It stands on the declivity of a hill overlooking the river Arun, 11 m. E. of Chichester by railway. At the summit of this hill is the castle, the seat of the duke of Norfolk and earl of Arundel. Founded in the 10th century,



Arundel borough seal

it was besieged in 1102 by Henry I and in 1139 by Stephen, and was laid in ruins by the Parliamentary forces in 1644. Its restoration was begun in 1791, and it is now one of the most magnificent mansions in the kingdom. It includes a 12th century circular Norman keep, 100 ft. high, and is surrounded by a park of 1,200 acres stocked with deer.

The Perpendicular church of S. Nicholas, dating from the late 14th century, is a cruciform building with a central tower and a fine reredos. The Fitzalan chapel, or

chancel, containing monuments of the earls of Arundel, is the private property of the duke of Norfolk, and is screened off from the remainder of the church. This privilege was confirmed after legal proceedings in 1880. The Roman Catholic church of S. Philip Neri was built by the 15th duke.

The town trades in corn and is chiefly residential; the river is noted for boating and for mullet. Arundel was mentioned as a borough in the will of Alfred the Great. It is a borough by prescription and its privileges were confirmed by a charter from Queen Elizabeth. In 1950 Arundel and Shoreham became a co. parl. div. Pop. 2,489.

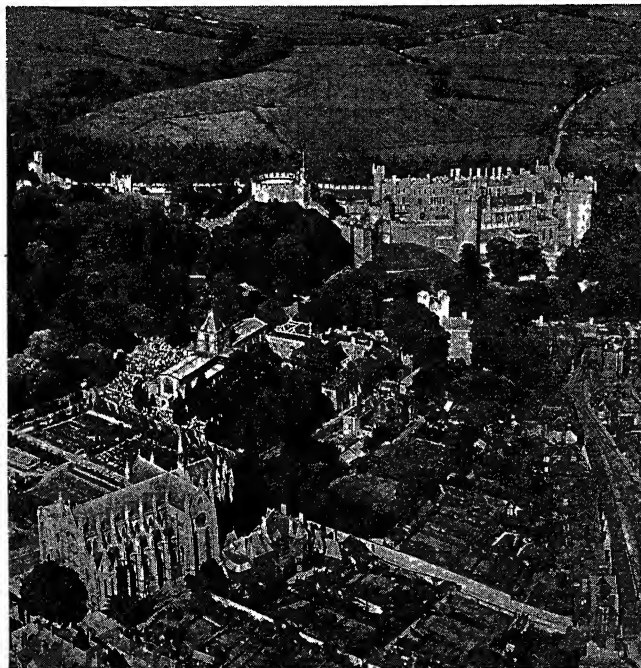
Arundel, EARL OF. English title, the oldest of its kind, now borne by the duke of Norfolk. In the 12th century the earl who watched over the king's interests in Sussex was sometimes called the earl of Arundel, the castle of which was his property. From one of these early earls Arundel Castle passed to the family of Fitzalan, and members of this family became known as earls of Arundel. They suffered the vicissitudes of fortune so common in the 14th and 15th centuries, and from time to time the earldom was without a holder. In 1433, however, it was decided that it was attached to the castle and lordship of Arundel, and as

owners thereof the Fitzalans retained it until 1580, when the family became extinct in the male line. The heir of the last Fitzalan earl was his grandson, Philip Howard, and in this way the dignity passed to the Howards, but their right to it was not secured until 1627, when an Act of Parliament settled it on Philip's son, Thomas. In 1660 Thomas received the dukedom of Norfolk, and since then earl of Arundel has been a subsidiary title of the duke.

Arundel, RICHARD, EARL OF (c. 1346-97). English nobleman. Like his brother Thomas, archbishop of Canterbury, he was a leading figure in the reign of Richard II, being one of the governors of the kingdom during the king's minority. He was one of the coterie of nobles, called the lords appellant, who, in 1389, overthrew the king's ministers and for some years controlled public affairs. In 1397, however, Richard took his revenge. Arundel was arrested, found guilty of treason, and beheaded Sept. 21, 1397.

Arundel, HENRY FITZALAN, EARL OF (c. 1518-80). English nobleman. He became 12th earl of Arundel on his father's death in 1544, when he had already served in public life as governor of Calais and in other ways. In Edward VI's reign he was imprisoned for an alleged share in a plot, and on the young king's death, although nominally a supporter of Northumberland he secretly opposed his plan of supplanting Mary by Lady Jane Grey. He was then the leader of the party which secured Mary's accession, and during her short reign was one of the chief persons in the realm. Elizabeth, too, favoured him, at least for a few years, but he was soon suspected with other Roman Catholics of attempts to secure the throne for Mary Queen of Scots. He was arrested more than once, but escaped capital punishment and died Feb. 24, 1580. Although twice married, Arundel had no sons, and his ultimate heir was Philip Howard, the son of his daughter Mary by marriage with the 4th duke of Norfolk, a union which united the Fitzalans and the Howards.

Arundel, PHILIP HOWARD, 1ST EARL OF (1557-95). English nobleman. The eldest son of Thomas Howard, 4th duke of Norfolk, his mother was Mary, daughter of Henry Fitzalan, 12th earl of Arundel. Born June 28, 1557, he married a Dacre in 1571, and in 1580 succeeded his grandfather as



Arundel. Air view of the town and castle. Left foreground is the R.C. church of S. Philip Neri; beyond is the 14th cent. church of S. Nicholas

earl of Arundel. His father had been put to death as a traitor in 1572, but he was allowed, after some debate, to succeed to the honour and castle of Arundel. In 1584 he joined the Roman Catholic Church; his conduct in promoting its interests laid him open to suspicion, and from 1585 until his death, Oct. 19, 1595, he was in prison. He was tried and found guilty of treason, but the death sentence was not carried out.

Arundel, THOMAS HOWARD, 2ND EARL OF (1586–1646). English nobleman and art collector. Born at Finchamfield, Essex, July 7, 1586, he was educated at Westminster School and Trinity College, Cambridge. His father's attainder cost his son, then about ten years old, the lands and titles; but James I restored the titles of Arundel and Surrey. Then marriage with a wealthy daughter of the earl of Shrewsbury enabled Thomas Howard, who joined the Church of England in 1615, to buy back Arundel House in London and other properties.

From 1615 onwards he collected all kinds of antiquities and works of art. His collection, ultimately arranged in Arundel House, comprised statues, busts, inscribed stones, pictures, etc. The earl, who had sided with the king in the Civil War, died at Padua, Oct. 4, 1646. His grandson, Henry, 6th duke of Norfolk, who had inherited the major part of his treasures, was induced by John Evelyn in 1667 to leave the bulk of the sculptures and inscribed stones to the university of Oxford.

Arundel, THOMAS (1353–1414). Archbishop of Canterbury. Third son of Richard Fitzalan, earl of Arundel, he was made bishop of Ely in 1374, archbishop of York in 1388, and archbishop of Canterbury in 1396, and was lord chancellor from 1386 to 1389 and again from 1391 to 1396. In 1397 he was banished by Richard II for his part in procuring the commission of regency eleven years before, but he returned to England with Henry IV, being lord chancellor again in 1399, 1407, and 1412. His later years were largely occupied with proceedings against the Lollards. He died Feb. 19, 1414, and



Thomas Howard, second Earl of Arundel and Surrey, English royalist
After the original by Rubens

was buried in Canterbury cathedral. Of princely tastes, he left fine buildings at Ely and Canterbury.

Arundell, DENNIS (b. 1898). British actor and producer. Born at Finchley, July 22, 1898, and educated at Tonbridge and St. John's College, Cambridge, he made his first stage appearance in 1926. He



Arundel Marbles. Collection made by the 2nd Earl of Arundel, now in the Ashmolean Museum, Oxford

scored a notable success as the sinister Victorian husband in *Gas Light*, 1939. He produced many plays and composed much stage music, appeared in a number of films, and was a frequent broadcaster.

Arundell of Wardour, BARON. English title borne by the family of Arundell, 1605–1944. Thomas Arundell of Wardour Castle, Wiltshire, served with distinction in the army of the emperor Rudolph II, and was made a count of the Holy Roman Empire in 1595. Because of this he was in disfavour when he returned to England; his father disinherited him and he was im-

prisoned. However, James I gave him his title, but his avowed sympathy for his fellow Roman Catholics brought him later into trouble. He died Nov., 1632, having inherited his father's estates.

Arundell's son, Thomas, the 2nd baron, was a supporter of Charles I during the Civil War. His castle, defended by his wife Lady Blanche, 1643, during his absence at Oxford, was lost and subsequently regained by his son. He died of wounds in 1643. His son, the 3rd baron, was impoverished by the war, but recovered his estates at the Restoration and was in the confidence of Charles II. A strong Roman Catholic, he was one of those who suffered when Titus Oates was active in 1678, but though impeached and imprisoned in the Tower until 1685, he was never brought to trial. He served James II, retired into private life, 1688, and died Dec. 28, 1694. In 1939 John Francis Arundell became the 16th baron. On his death Sept. 25, 1944, the title lapsed.

Arundel Marbles. Collection of antiquities and sculptures. It was bequeathed to Oxford university by the 6th duke of Norfolk in 1667 and housed in the Ashmolean Museum. The collection includes the Parian Chronicle, so named from the island of Paros, where it was found, a chronological outline of Greek history from 1582 to 264 B.C., the last 91 years of which are missing.

Arundel Prints. Collection of prints published by a society of that name founded in London in 1848 and closed in 1898. Usually chromolithographs, especially after the early Italian masters, they were of great value to students.

Aruns. Etruscan word, possibly meaning younger son. Used by the Romans as a proper name, especially in the Tarquin family.

Arunta. Aboriginal tribe and tribal group occupying the centre of Australia. Its social organization, probably of late development, differs radically from that of other tribes, and is related to its philosophic guesses at the mystery of human origin. The Arunta totem is not inherited, marriage within it is permissible, it may in some circumstances be eaten, and its supply—animal, plant, rain—increased by ceremonial invocation. See *Churinga*.

Arusha. Town of Tanganyika, formerly German East Africa. It is 56 m. W.S.W. of Moshi, and the continuation of the railway from that town has connected it with the port of Tanga. During the

First Great War it was occupied by General Smuts's mounted scouts on March 20, 1916.

Aruwimi. River of the Belgian Congo. It rises near the Albert Nyanza and flows generally W. to the Congo. It drains an immense tract of forest country, estimated at 70,000 sq. m., and is about 800 m. long. Its navigation is largely obstructed by rapids. Stanley explored it in 1883 and 1887. *Consult* In Darkest Africa, H. M. Stanley, 1890.

Arvad. Ancient city of Phoenicia. It was the Greek Arados and stood on the island of Ruad, near Tartus. Referred to in Gen. 10, it was an important town said to have been founded by refugees from Sidon, although probably of much earlier date. There are remains of the city walls, a temple, tombs, and an amphitheatre. The modern village is Ruad.

Arval. An old English funeral feast; also a funeral loaf or cake. The word apparently comes from Norse *arfr öl* (inheritance banquet). Arvel, arthel, and other forms occur. At the death of a person leaving property it was long customary, especially in the N. of England, to invite friends and neighbours to dinner on the day of the burial, when the corpse was exposed to avert any suspicion of foul play on the part of the heir and the beneficiaries. Arval bread or cake was given to the poor and sometimes sent to absent friends. The custom is of great antiquity and may have been introduced by the Romans.

In Roman antiquity, the Arval brethren formed a priestly college of twelve members, among them the emperor himself, who conducted various ceremonies to ensure fruitful harvests and celebrated the festival of Bona Dea, an old Roman goddess of fertility. Their ritual hymn furnishes the oldest existing specimen of the Latin language, and in late republican times was unintelligible even to the priests.

Arve. River of France. It rises in the Col de Balme in the Pennine Alps, and flows 60 m. through the valley of Chamonix to the Rhône below Geneva.

Arverni. Tribe of ancient Gaul, which inhabited the region of Aquitania now known as Auvergne. They bravely resisted Caesar in 52 B.C., but were defeated, their chief Vercingetorix being taken prisoner and later put to death.

Arveyron. A river of France. Rising at the N. end of the Mer de Glace, in the valley of Chamonix,

it issues as a torrent through an ice grotto and flows to the Arve.

Aryan (Skt. *arya*, noble). Name applied to the family of related languages alternatively called Indo-European or Indo-Germanic, synonyms which originated in 1814 with Thomas Young and in 1823 with H. J. Klaproth respectively. Aryan has also been employed to denote the inferential parent speech of the Indo-European family. By some philologists it is confined to the Asiatic branch, but no corresponding term for the European branch has met with acceptance. The word apparently indicates the claim to nobility made by the people by whom it was introduced.

This family of inflexional languages presents many affinities of word and syntax, pointing to an essential community of origin. Thus the word *father* appears in Gothic *faðar*, Armenian *hair*, Old Irish *athir*, Greek and Latin *pater*, Persian *pidar*, Sanskrit and Zend *pitar*. Further analysis established well-marked differences between the W. or European and the E. or Asiatic branches, as in the use of the guttural *k* by the one and the sibilant *s* by the other. The W. branch is again divisible into groups: (1) Teutonic, (2) Celtic, (3) Italic, (4) Hellenic; the E. branch into (1) Balto-Slavonic, (2) Albanian, (3) Armenian, (4) Indo-Iranian. The further development of this aspect of the subject belongs to philology.

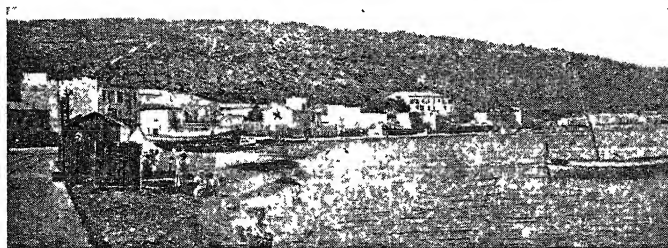
It was Professor Max Müller who familiarised the public with the conception of a primitive Aryan population, dwelling in idyllic simplicity "somewhere in (west central) Asia." Yet, despite the vigorous protest of his maturer years, the notion that the Aryan-speaking peoples are members of a homogeneous Aryan race still survives in popular usage. Comparative philology has established their community of speech; ethnology has no less demonstrated their diversity of blood. While almost all these peoples are radically Caucasian, there is no place in the ethnic category for a generic Aryan stock. The tendency of modern research is to recognize in prehistoric Europe three physical types, which may be called Nordic, Alpine, and Mediterranean. The Nordic and Mediterranean long-heads are blonds and brunettes, Huxley's fair-whites and dark-whites; the Alpines are short-heads of intermediate tint and eastern affinities. Each type was developed under its own con-

ditions of geography and climate; each probably absorbed the racial elements which it encountered. Admitting that a complex effort of the human mind, such as the invention of an inflexional language, is unlikely to have been made more than once in the same way, a primary Aryan speech, as distinct from a parent Aryan race, may be accepted. The crux of the controversy concerning the site of the first Aryan homestead lies here. That Aryan speech began in Europe was first suggested by Latham in 1851; its eastern origin was maintained to the end by Max Müller. The rival theories are not irreconcilable, remembering that the steppe-land that extends from the Carpathians to the Pamirs is continuous and independent of modern continental demarcations.

That this inflexional speech displaced in turn the prehistoric tongues of the first Nordic, Alpine, and Mediterranean peoples, affecting their culture without coordinating their blood, accords with historic experience. That language exerted a profound influence upon social organization and religion is an equally permissible conclusion. The fuller solution of the Aryan problem awaits the systematic study of the archaeology and geography of the vast steppe-land which witnessed the birth of the speech that now dominates mankind.

All ethnologists are agreed that Aryan is primarily a philological term, and that even though Indians and Persians descended from an Indo-Iranian stock may permissibly be styled Aryans, there are no Aryans in Europe. Yet the word was seized on by Hitler and the Nazi theorists to describe the pure "Nordics," who were so strongly opposed to the "non-Aryan" Jews. The human suffering that has resulted in recent years from the adoption of the Aryan myth is impossible to over-estimate. See *Ethnology*; *Language*.

Arya Samaj (Hind., Aryan Society). A Hindu theistic association. It was founded by the Brahman Dayananda Sarasvati (c. 1825-83) about 1866. Its members, following their founder, hold that the Vedas constitute divine revelation, that they are the repository of the only true knowledge, and that in them the faithful can find all so-called modern scientific and ethical developments. The Arya Samaj is actively opposed to outside influences, and its programme includes extensive social and political reforms.



Arzeu. General view of the Algerian seaport looking towards the Quai des Pêcheurs

Arzeu OR ARZEW. A seaport of Algeria. The ancient *Arsenaria*, it is on the Mediterranean, 30 m. by rly. N.E. of Oran, and has rly. communication with Algiers and the interior. It is a French military station and exports salt and esparto. Near by are the Kléber marble quarries of Numidia.

Arzila OR AZILA. A harbour of Morocco, in the Spanish zone. On the Atlantic coast, 25 m. S.W. of Tangier, it ships grain. Pop. 10,766.

As. In Norse mythology, singular of *aesir* (*g.v.*), the chief deities.

As. General Latin term for a unit. It was used of measure and weight, being divided into 12 *uncia*, ounces or inches. *As* was also the name given to a Roman coin, originally weighing a pound (*libra*) of copper, but afterwards subject to great fluctuations. In France the term is used for the ace or the number one in games of chance.

Asa. Third king of Judah, 9th century B.C. An energetic and capable ruler, he is praised for his religious zeal. In alliance with Benhadad, king of Syria, whose services he repaid with the treasures of the Temple and the royal palace, he defeated Baasha, king of Israel (1 Kings 15).

Asafoetida. Gum-resin secreted by various species of *Ferula* from Eastern Persia and Western Afghanistan. It occurs as paste, "tears," and lumps, possesses an offensive odour, and is commonly called devil's dung. It is used to a small extent in medicine and in America for "heaves" in horses.

Asama-Yama. Largest active volcano of Japan. It is in Honshu, about 85 m. N.W. of Tokyo, and is 8,280 ft. high, with a crater 1,000 ft. in diameter. A destructive eruption occurred in 1783.

Asansol. A town in W. Bengal, India. It is situated on the river Damodar in the W. of the prov., and is a new town and rly. junction on the Raniganj coalfield. It is the most progressive town in the district of Burdwan. Pop. 26,499, two-thirds Hindus.

Asaph. Levite who was chief musician at David's festival sacrifice when the ark was brought up to Zion (1 Chron. 15 and 16). The superscription of the name of Asaph to Ps. 50, 73-83 suggests that these were sung by the Asaphite choir of the Temple.

Asar OR OSAR. Swedish term for steep-sided banks and ridges of stratified deposits of sand and gravel. They are believed to have been formed in tunnels made by streams under the great glaciers and ice sheets of the Ice Age. In the lower parts of Sweden they traverse the land like great embankments which attain an elevation of from 50 ft. to 100 ft., and follow a sinuous course comparable to that of a river, often for more than 100 m. In Scotland similar ridges are called *kames*, and in Ireland *eskers*.

Asarabacca (Latin *asarum*, hazelwort; *bacca*, berry). Perennial herb of the family *Aristolochiaceae*. It has a creeping fleshy rootstock and dark-green permanent leaves, two of which are produced each year, with a stalked, greenish-purple flower between them, and a bell-shaped perianth with three lobes, enclosing 12 stamens and six styles. Both leaves and root are acrid and aromatic, but only the rootstock was used in medicine, as a purgative and emetic.

Asbestos (Greek, inextinguishable). A silky fibrous mineral belonging to the group of amphiboles. Usually found in veins in association with serpentine and other rocks rich in magnesia, its value lies in its high melting point and low conductivity to heat. It resists alkalis and most acids, and when strengthened by compounding with Portland cement it forms a valuable building and constructional material. Fibrous asbestos is spun and woven into a fabric to form the lagging of pipes and vessels against heat loss. The fabric is used also for protective clothing of firemen, especially for personnel of aircraft carriers and

airfields who have to deal with petrol fires. Asbestos "boards" are employed to line walls and roofs of buildings as an insulation against heat loss; conversely, the boards are fixed to the inside of steel-roofed buildings to shield the interior from excessive heating by the sun's rays.

Asbestos-cement is made into sheeting—corrugated or plain—for clothing the sides or roofs of light buildings; "tiles" of asbestos-cement are largely used for roofing both permanent and temporary structures, and have the advantage of lightness as compared with clay tiles. The material is made into pipes and gutters for rainwater drainage; also flue pipes and baffles for gas-fired water heaters, geysers, etc. Ventilating cowls and baffles are other asbestos-cement products. Though the material is somewhat brittle it is in other respects very durable. Most of the world's asbestos comes from Canada, with Rhodesia, Russia, and South Africa next in order of magnitude. The serpentine rocks in which the small veins of asbestos occur are crushed to obtain the fibrous material.

Asbjornsen, PETER CHRISTEN (1812-85). Norwegian folklorist and zoologist. Born Jan. 15, 1812, at Christiania (Oslo), he was a student and later a lecturer at the university. He was employed from 1846 onwards in exploring the Norwegian coast, studying forestry, and investigating peat manufacture in Holland, Germany, and Denmark. He retired in 1876 and died at Christiania, Jan. 6, 1885. He collaborated with his friend Jørgen Engenbretsen Moe (1813-82) in making a collection of Norwegian Folk Tales, published in three series, 1842-71. He published an independent collection of fairy tales in 1845.

Asbury, FRANCIS (1745-1816). American Methodist bishop. Born near Birmingham, England, Asbury became a follower of John Wesley, and in 1771 went to America as a missionary, his headquarters being Philadelphia. In 1784 he was chosen one of the two superintendents of the new Methodist Episcopal Church. He was the first of his church to take the title of bishop. He died unmarried, March 31, 1816.



P. C. Asbjornsen, Norwegian writer

directed to the right training of the soul in the worship of God, and in the practice of charity between man and man. The teaching of Christ in Matt. 10, Luke 14, and other passages contains fuller expression of the significance of asceticism, the necessity for Christians, on occasion, of detachment from family ties, of the mortification of the senses, and of the refusal to accept the standards of the world. St. Paul in 1 Cor. 9 emphasises this doctrine. In the 3rd and 4th centuries came the beginning of Christian monasticism, and the vows of poverty, chastity, and obedience enjoined further practice in asceticism for the fuller conquest of the desires of the flesh and deeper contempt of the allurements of the world. At the same time, the Christian Church always steadily insisted that the disposition of the heart was the essential thing, that heaven could not be won by mortifications, and that family life was entirely compatible with that self-negation which is at the root of asceticism.

Against the official Christian and Catholic teaching of the Church on asceticism, the Encratites, a Syrian sect, revolted in the 2nd century, followed by the Montanists and the Manichaeans. The demand of all these sectaries was for the utmost mortification of the flesh, and it was based on the belief that matter being evil in itself the material body was a product of evil. The extravagances of asceticism were in these often followed by the wildest reactions.

The flagellants who wandered over Europe in the 14th and 15th centuries, scourging themselves in public processions, and the Cathari and Waldenses of N. Italy and S. France in the 12th and 13th, who professed a higher asceticism and, following the Manichaeans, declared the body evil, were all condemned by the Church. Protestantism in the Calvinists and Puritans of the 17th century and the Methodists of the 18th maintained that asceticism lay chiefly in abstaining from card-playing, dancing, and rural sports, and in refraining from social recreation on Sunday. See Christianity; Monasticism.

Asch. Town and district of Czecho-Slovakia. It stands at the base of the Hainberg, on the borders of Saxony and Bavaria, 16 m. by rly. N.W. of Eger. It is a manufacturing centre, with large woollen and silk factories, and bleaching and dyeing works. Pop. 22,493.

Asch, SHOLIM (b. 1880). Polish-American author. Born in Warsaw, he began by writing stories in Yiddish of Jewish life in Poland and Russia, of which *The Town*, 1907, was first. He became famous in 1930 with the translation of *Three Cities*, a long novel of life in Warsaw, Petrograd, and Moscow just before the Bolshevik revolution. Since then there have been translations of *The Paper Calf*, *Mottke the Vagabond*, *Salvation*, *The Nazarene*; a volume of short stories, *The Children of Abraham*; and *My Personal Faith*. Asch also wrote poetry and several plays, of which *The God of Vengeance*, 1907, was very successful. He left Poland for France, and eventually for the U.S.A.

Aschaffenburg. A town of Bavaria. It stands on the Main at its junction with the Aschaff, 26 m. by rly. S.E. of Frankfurt. It has a cathedral dating from the 12th and 13th centuries, containing interesting monuments; the castle of Johannisburg, built in the 17th century, and formerly a summer seat of the electors of Mainz, and now a museum and picture-gallery; and some fine old historic houses. It manufactures paper, clothing, and tobacco, and is a centre for the trade carried along the Main. In the Middle Ages it was an important place and the capital of a little principality, part of the electorate of Mainz, which was handed over to Bavaria in 1814. The German garrison put up fanatical resistance to the U.S. 7th army during the latter's spectacular advance into Bavaria in April, 1945. On April 4 the town was finally cleared by the Americans. Pop. (pre-war) 34,056.

Ascham, ROGER (1515-68). English classical scholar. Born at Kirby Wiske, Yorkshire, he was sent by Sir Antony Wingfield to St. John's College, Cambridge, where he obtained a fellowship in 1534. In 1538 he was appointed Greek reader at St. John's, and in 1545 published *Toxophilus*, a treatise on archery, written in the purest English and dedicated to Henry VIII, who gave him a pension of £10 a year. Tutor to Princess (afterwards Queen) Elizabeth at Cheshunt, 1548-50, Ascham spent three years on the Continent, mainly at Augsburg, as secretary to Sir Richard Morysin (Morison), ambassador to Charles V. A diary he had kept during this time was published in 1553, under the title of *A Report of the Affaires and State of Germany*. The remaining years of his life, passed

as Latin secretary and tutor first to Queen Mary and then to Queen Elizabeth, were clouded by poverty and anxiety for the future of his wife and family. He died Dec. 30, 1568, leaving his widow to bring out in 1570 *The Scholemaster*, his treatise on classical education, pleading for a more intelligent teaching of languages.

Asche, OSCAR (1872-1936). Anglo-Australian actor. Born at Geelong, Victoria, Jan. 26, 1872, of Norwegian descent, he studied acting at Christiania (Oslo), making his first appearance in London in 1893 at the Opéra Comique in *Man and Woman*. After eight



Oscar Asche, Anglo-Australian actor

years in Sir Frank Benson's repertory company, he joined Sir Herbert Tree in 1902. He became manager of the Adolphi Theatre with Otho Stuart in 1904, of His Majesty's Theatre in 1907, and later of the Globe Theatre. He married the actress Lily Brayton. He staged a number of spectacular plays, and played the title rôle (1916-21) in the record-breaking *Chu Chin Chow* (q.v.). He died March 23, 1936. His autobiography was published 1929.

Aschersleben. Town of Germany, in Saxony. It stands on the Elbe near its union with the Wipper, and is 36 m. by rly. N.W. of Halle. Founded in the 11th century, it possesses an old Latin school, a 15th century church, and a town hall. It manufactures sugar, beer, earthenware, and woollen goods. In the neighbourhood coal is found and beet grown. Aschersleben passed to Brandenburg by the peace of Westphalia in 1648, having previously been in the bishopric of Halberstadt. Pop. 28,627.

Ascidians (Gr. *askidion*, little skin bag). Group of tunicates or sea-squirts. Found attached to the rocks round the shore, and formerly regarded as molluscs, they form a kind of link between the vertebrates and the invertebrates. In appearance they resemble a leathern bottle with two necks, but in the larval stage, when they swim about freely, they possess a tail which contains a notochord, embryonic representative of the backbone in vertebrates. The sub-phylum Tunicata is also called Urochorda, meaning tail-string.

The common sea-squirt has a leathery cuticle, usually more or less coated with sand and largely composed of tunicin. The ascidians include a large number of genera and species, and vary greatly in size and shape. All take in their food with the water which they inhale through an orifice in the cuticle. The food particles adhere to the slime in the mouth-tube, and are thus passed into the stomach. The heart, after forcing the blood in one direction for a time, stops and then starts pumping in the opposite direction. All ascidians are hermaphrodites.

Ascites. Accumulation of fluid within the peritoneal or abdominal cavity. Most frequently it is the result of chronic Bright's disease, heart disease, cirrhosis of the liver, or a tumour pressing upon the veins and obstructing the circulation. In mild cases ascites can be relieved by the administration of drugs, which abstract water from the body through either the urinary or the intestinal system. In severer cases the abdomen must be tapped and the fluid drained off.

Asclepiadaceae. Large family of climbing shrubs and herbs, mostly with poisonous, acrid, milky juices, and chiefly natives of the tropics. There are many genera and more than 1,500 species. They agree in having the pollen-grains aggregated in waxy masses, sometimes enclosed in a bag formed from part of the stamens. These pollen-masses are accidentally picked up by insects visiting the flowers, and are then transported to the receptive disk of the pistil—thus effecting pollination. See *Carrion Flower*; *Swallow-wort*; *Wax-flower*.



Asclepiadaceae. Flowering part of *Asclepias Syriaca*

Asclepiades (c. 270 B.C.). A Greek lyric poet and epigrammatist of Samos. The invention of the Asclepiadean metre, in which the first Ode of Horace is written, is attributed to him.

Ascoli Piceno. Town and episcopal see of central Italy. The capital of the province of Ascoli Piceno, it stands on the Tronto, 20 m. by rly. W. of Porto d'Ascoli and 73 m. by rly. due S. of Ancona. The Asculum Picenum of the Romans, it retains portions of its ancient walls, gateways, and two Roman bridges. It has a cathedral said to have been founded by Constantine the Great, several churches, a communal palace containing a museum, a castle, a fortress, a convent, and a picture-gallery. Majolica, silk, glass, cloth, and leather are manufactured. Taken by Rome in 268 B.C., it suffered greatly in the Social War, 89, was occupied by Caesar, and taken by Totila in A.D. 545. Pop. 38,111.

Ascomycetes (Gr. *askos*, bag; *mykētes*, fungi). Large primary division of fungi. It contains many genera and thousands of species, most of them very small and little known. The character of the order is that eight spores are contained in a microscopic cell (*ascus*) embedded in the spore-bearing membrane (*hymenium*). Among the better known larger forms may be mentioned truffles, morels, and the saucer-shaped *Pezizas*.

Ascorbic Acid, HEXURONIC ACID, OR VITAMIN C. This substance is the anti-scorbutic vitamin present in most fresh fruits, salads, and lightly cooked vegetables and potatoes. It is a carbohydrate of simple structure ($C_6H_8O_6$), and is now manufactured on a commercial scale. Lack of ascorbic acid in the diet gives rise to symptoms of scurvy, the first disease proved to be due to a dietary deficiency. Ascorbic acid was first obtained in a pure state in 1923, when it was termed hexuronic acid. The international unit of vitamin C is 0.05 mgm. of pure L-ascorbic acid, equal to about 0.1 c.c. of lemon juice. See *Scurvy*; *Vitamins*.

Ascot. Village of Berks, England. It is 29 m. by rly. S.W. of London, 6½ m. S.W. of Windsor, and is a Green Line terminus. By order of Queen Anne a race-course was laid out on Ascot Heath in 1711, and the annual meeting in June, notable for the royal procession instituted in 1820, is one of the most popular and fashionable fixtures under the

auspices of the Jockey Club. It is a right-hand circular course of a little less than 1½ m., the last mile being straight and uphill.

Ascot Gold Cup.

Name of an English horse race. It is the principal event of the Ascot race meeting, and is run over a course of 2½ m. In 1907, the centenary of its first award, the cup was stolen from the grand stand, and The White Knight and a French horse Eider ran a dead heat, the latter being disqualified for bumping and boring. See *Horse Racing*.

Asdic. A highly efficient system of submarine detection, developed by the Royal Navy after the First Great War. The word itself is



Ascot Gold Cup



Ascomycetes. *Gyromitra esculenta*, of this division of fungi

compounded from the initials of Anti- (or Admiralty) Submarine Detection Investigation Committee, set up in 1918 to seek improved methods of tracking submarines under water. Hydrophones, which had been in use for this purpose in 1916-18, were found to have limitations. As the result of experiments undertaken between 1919 and 1939, the Asdic method was gradually perfected, proving an unpleasant surprise for the U-boats in their initial onslaught of the Second Great War. Later, the secrets of Asdic were shared with Allied navies, so are no longer completely confidential.

Before 1939 both the U.S. and German navies had conducted

experiments on similar principles, though without reaching equal results. All through the war the Germans continued to lag behind the Allies in the efficiency of their anti-submarine methods. The Italian navy continued to concentrate instead on highly sensitive types of hydrophones, with which some success was recorded.

Asdic transmits through the water a supersonic sound wave, which is echoed back to the transmitter by any solid object that may be encountered below the surface within a certain radius. Water is the essential conducting medium. Methods of operation may differ, but as a rule the returning wave is made audible to the operator's telephones by a heterodyne process, since the sounds would be inaudible to the human ear. By recording devices it is possible to ascertain accurately the range of any echo received, the speed of sound through water being a known factor. A suitable frequency is chosen for transmission, so that the sound beam sent out may be very narrow in width. By this means an accurate bearing of any object can be obtained. Range can be read from a scale, but it requires skill to operate the gear successfully. Without experience, mistakes may easily be made in the classification of returning echoes from rocks, sunken wrecks, etc.

When the Alarm is Given

When an echo has been received which the ship's Asdic operator classifies as coming from the hull of a submarine, the ship is at once headed towards the centre of the target, and closes it as rapidly as possible. Series of ranges and bearings are taken in quick succession, and the course and speed of the target are thus assessed. According to the type of weapon in use, the necessary attacking course is steered, so that no time may be lost in engaging the enemy. Depth charges or other missiles are released as soon as the target is within suitable range.

Differences in water temperatures, e.g. the intervention of a current of colder or warmer water, may affect the path of a sound beam through the sea. A skilful submarine captain seeks to take advantage of any such aid.

In times of peace Asdic is likely to be used extensively by the whaling industry. A whale beneath the surface can thus be located and attacked in much the same way as a submarine. See Hedgehog Projector.

Asellus (Lat., little ass). Small isopod crustacean common in English ponds and ditches, often called the fresh-water shrimp. Grey in colour, it is about $\frac{1}{2}$ in. in length.

Asepsis (Gr. *a*, not; *sepsis*, putrefaction). Term meaning the absence of septic matter or freedom from infection. Wounds are kept in an aseptic condition by solutions and dressings which have been made absolutely sterile, i.e. free from micro-organisms. See Antiseptics.

Asef. Variant name of the Moroccan seaport of Safi (*q.v.*).

Asgard (Old Norse *áss*, god; *gardhr*, home). In Norse mythology, city of the Aesir. Situated high in the heavens, it was reached from the lower worlds by the bridge Bifrost. Round its walls was a moat with inflammable vapour floating upon it (clouds and lightning). In the city the gods first built a great hall shining with gold, in which were twelve lofty seats; and then beautiful houses for themselves. See Aesir; Bifrost.

Ash (*Fraxinus excelsior*). Tree of the family Oleaceae, a native of Europe, N. Asia, and N. America. It attains a height of from 50 ft. to 80, or even 100 ft., with a trunk about 3 ft. in diameter, and a pale grey bark, which remains smooth for about 30 years and then becomes rough and furrowed.

The leaves, which are very large, are divided into from 9 to 15 lance-shaped leaflets, popularly regarded as complete leaves. The flowers are degenerate, having lost their petals and sepals to adapt them for wind-pollination. They are of several kinds: in some the pistil alone develops fully, the two stamens dropping off without shedding pollen; in others the

purple stamens mature, but there is no pistil developed; in a third form both pistil and stamens are perfect. The flowers are produced in clusters in April or May, before the leaf-buds expand. Female and bi-sexual flowers produce each a strap-shaped fruit, $1\frac{1}{2}$ in. long, one-third of which is taken up by the seed. Botanically known as samaras, these fruits are popularly called "ash-keys" or "spinners," the latter owing to a slight twist in the blade which causes them to spin as they fall when ripe. A secretion from the inner bark is known as manna, an old-fashioned laxative.

The ash becomes the dominant tree in woods on limestone at about 1,000 ft.-1,250 ft. elevation, and in non-calcareous soils if there is abundant moisture. The tough, elastic timber, which is harder and more durable when grown on limestone soil, is valuable for farm, carriage, and furniture work.

Ash. The residue of anything burnt. The mineral constituents of an organic substance are determined by incinerating the compound in a platinum crucible. The process destroys the organic or vegetable matter entirely, leaving the mineral matters behind. The ash, however, does not accurately represent the constituents of the plant, as the heat employed destroys carbonates and nitrates, while chlorine will be lost by volatilisation. Tobacco ash, for example, will show the presence of potash, but nitrogen, which was combined with it as nitrate of potash, will have been decomposed. Nitrate of potash is the component upon which the ready burning properties of tobacco depend.

Determinations of ash are useful in revealing the constituents of the soil which are absorbed by the roots of the plant and are necessary for normal growth. The information obtained enables the agriculturist to supply the soil with the elements required by the plant which may be absent or in insufficient quantity. In the analysis of vegetable drugs the proportion of ash is an indication of the amount of extraneous matter present, hence it is customary to limit the amount of ash present in crude drugs.

Volcanic ash is the finer solid particles ejected from active volcanoes of the Vesuvian type. Originating from the explosive disruption of lava at the time of its emission from the volcanic vent, it may be borne on the wind for great distances. Volcanic ash



Ash. Study of ash trees, by John Constable, R.A.

was largely answerable for the destruction of Pompeii, A.D. 79, and an important factor in the destruction wrought by the eruption of Mt. Pelée in Martinique in 1902. Beds of volcanic ash, composed of fragments of lava and broken crystals of felspar and other minerals, are met with among the stratified rocks of different ages in all parts of the world, pointing to volcanic episodes of which no other traces exist.

Ashango. Negroid tribe of forest-dwellers in French Equatorial Africa. Occupying a tableland midway between Cape Lopez and Stanley Pool on the Congo, they carry spears and poisoned arrows, and live in large untidy huts, exploiting the Obongo pygmies dwelling around them. They cultivate ground-nuts, keep bees, and raise goats and poultry, whose flesh is forbidden to women and children. *See* Negro.

Ashanti. British possession in West Africa. It is attached to the Gold Coast colony, and has an area of 24,379 sq. m. In 1931 its population was returned as 578,702. The French Ivory Coast colony is on the W., Togoland on the E., while the Gold Coast colony separates it from the Gulf of Guinea.

Much of the country is thickly covered with forests, with abundant tropical fauna. It is well watered by numerous broad streams, but the Volta, which divides Ashanti from Togoland, is the only navigable river. Kumasi, the capital, has some 42,000 inhabitants. It is connected by rly. with Takoradi and Accra, on the Gulf of Guinea, and by trunk motor-road to Pamu, Mampong, and Kpandu. The chief products are gold, rubber, cocoa, tobacco palm oil, bananas, and timber, especially mahogany and cedar. Tropical fruits and kola nuts are grown, cattle are raised, and some of the land is well cultivated with maize. Gold mining is the principal industry, especially in the Obuasi district, and the output has been valued at £300,000 a year. The rainy season lasts from May to October. The Ashantis make pottery, and are skilled in working in gold and in weaving. They worship spirits, and not long ago offered human sacrifices to their gods. Lake Busumchwi, about 26 m. S.E. of Kumasi, is regarded by them as sacred.

The Ashantis are a number of associated negro tribes akin to the Fantis. Each had its own king, but they recognized the king of Kumasi as their overlord, and he

occupied their golden stool or throne. The theory is that from the regions of the Senegal and the Niger they were driven into the forests to the S., where their warlike propensities developed. In the 18th century, especially under Osai Tutu, their activities attracted European attention, and they extended their dominion towards the coast. This brought them into conflict with the Fantis, and also with the British. Throughout the 19th century their recorded history is little more than conflicts with the British, arising out of their desire to push their authority still farther S. In 1896 Ashanti was made a British protectorate, and on Sept. 26, 1901, it was annexed. It is governed by a chief commissioner at Kumasi, who is on the executive council of the Gold Coast. It is divided into four provinces, central, southern, western, and northern, and for each there is a court of justice—at Obuasi, Kintampo, Kumasi, and Sunyani.

Bibliography. Ashanti and the Gold Coast, Sir J. C. D. Hay, 1874; Ashanti Law and Constitution, R. S. Rattray, 1924; The Tribes of the Ashanti Hinterland, R. S. Rattray, 1932.

Ashanti Wars. Great Britain has waged four wars against the Ashantis, the fourth being known as the Relief of Kumasi (*q.v.*).

The first war began in 1821, when, after some trouble about the right of protection over the Fantis and other tribes, a small British force, under Sir Charles McCarthy, entered Ashanti. This was routed, and Sir Charles killed at Essamako. The British crushed the Ashantis at Dodowah, Aug., 1826. In 1831 the Ashantis came to terms. Their king undertook to recognize the protectorate of Britain over all the tribes between the Prah and the sea.

In 1873 the second Ashanti war began. In Jan., the Ashantis invaded territory under British protection, and, the Fantis having been beaten in battle, Sir Garnet Wolseley was sent out. He advised a punitive expedition, and marched on Kumasi, fighting at Amoafu, Jan. 31, 1874, at Bekwai, and before Kumasi, which was entered Feb. 4. The town was set on fire, and Wolseley's little army, stricken with sickness, retired five weeks before an auxiliary force, under Sir John Glover, arrived, and found Kumasi deserted. The Ashanti king then asked for peace, and renounced all claims on the protected territory.

The third Ashanti war, in 1896, arose mainly out of King Prempeh's refusal to observe the terms of the treaty of 1874. A composite force, under Sir Francis Scott, advanced upon his capital in Dec., 1895. Kumasi was entered Jan. 17, 1896, and Prempeh taken a prisoner to the Gold Coast. The success of this bloodless campaign was largely due to the elaborate preparations made for its transport, and to the speed with which it acted. The Ashanti Star was awarded for this campaign. For the war of 1874, *consult* The Ashanti War, Sir H. Brackenbury, 1874; and The Story of a Soldier's Life, Viscount Wolsley, 1903; for that of 1896, The Downfall of Prempeh, R. S. S. Baden-Powell, 1896.

Ashbourne. Urban district and market town of Derbyshire, England. It stands on the Hemmore, near its junction with the Dove, 13 m. W.N.W. of Derby by the railway. It has a cruciform church, dating from 1241, with a central tower surmounted by a spire 212 ft. high, referred to locally as the Pride of the Peak, and a grammar school founded 1585. Ashbourne Hall was occupied by "Prince Charlie" during his advance in 1745. Ashbourne was often visited by Dr. Johnson, and Thomas Moore wrote part of Lalla Rookh here. Close by, in 1644, the troops of Charles I were defeated by the Parliamentarians. The industries include cotton and corset manufactures, and there is trade in agricultural produce. The Shrove Tuesday football match, in which all the village may take part, is a local tradition. Market day, Sat. Pop. 4,507.

Ashbourne, EDWARD GIBSON, 1st BARON (1837-1913). An Irish lawyer and politician. Born Dec. 4, 1837, he was educated at Trinity College, Dublin, and was called to the Irish bar in 1860. He sat in Parliament 1875-85 as member for Dublin university, and was attorney-general for Ireland from 1877 to 1880. In 1885 he was made lord chancellor of Ireland with a seat in the Cabinet, and was raised to the peerage. A strong advocate of land purchase, he was largely responsible for the Ashbourne Acts. He died May 22, 1913. His son, William Gibson, the 2nd baron, was born Dec. 16, 1868, and as president of the Gaelic League of London was a conspicuous protagonist of the Gaelic revival. The 3rd baron, Edward Russell Gibson (b. 1901), succeeded his uncle in 1942. *See* Land Purchase.

Ashburnham, EARL OF. British title borne by the family of Ashburnham 1730-1924. John Ashburnham was made a baron in 1689, and his son John an earl in 1730. John, the 2nd earl, was a courtier under George III, and from him the later earls are descended. Bertram Ashburnham, the 5th earl (1840-1913), succeeded to the peerage in 1878, having become a Roman Catholic in 1872. One of the earliest advocates of Irish self-government, he was chairman of the British Home Rule Association, 1886-1912. He was also the representative of Don Carlos in Great Britain and chairman of the Carlist Committee. Ashburnham Place in Sussex was the chief family residence. On the death of the 6th earl in 1924 the peerage became extinct.

Ashburnham, JOHN (c. 1603-71). English royalist. Son of Sir John Ashburnham, he became groom of the bedchamber in 1628. He sat in Parliament for Hastings, but in 1643 was discharged from the House for contempt. His conduct after Charles's escape from Hampton Court aroused the suspicion of the royalists, and for some years he was under a cloud. He suffered imprisonment under the Commonwealth. At the Restoration he was again made groom of the bedchamber, and from 1661 to 1667 was M.P. for Sussex.

Ashburton. River of Western Australia. Rising S.W. of the Great Sandy Desert, it flows 400 m. N.W. and enters the Indian Ocean at Onslow, traversing Ashburton goldfield. It is not navigable. It gives its name to a district.

Ashburton. Urban district and former market town of Devonshire, England. It lies in a beautiful valley, near the Dart, 24 m. N.E. of Plymouth by railway, and close to Dartmoor and Holne Chase. The 15th century church of S. Andrew has a tablet to the first Baron Ashburton, who was educated at the grammar school dating from 1314. Umberis worked for making paint. A borough by prescription, Ashburton was a stannary town, and returned a member to Parliament down to 1885. Pop. 2,395.

Ashburton. Town of South Island, New Zealand, in Canterbury county. It stands on Ashburton river, 53 m. by rly. S.W. of Christchurch. Pop. 7,130.

Ashburton, ALEXANDER BARING, BARON (1774-1848). British statesman and financier. He was the second son of Sir Francis

Baring, founder of the financial house of Baring Brothers & Co. He sat in Parliament 1806-35 for Taunton, Callington, Thetford, and North Essex, and opposed the Reform Bill. In 1834 he was president of the Board of Trade and master of the mint, and in 1835 was raised to the peerage. In 1842 he was sent to America to inquire into the north-west boundary and other questions, the treaty which ended the dispute being known as the Ashburton or Webster-Ashburton treaty (*v.i.*). He died at Longleat, May 13, 1848. The 6th baron (b. 1898) succeeded to the title in 1938.

Ashburton Challenge Shield. Trophy competed for annually at Bisley by teams of eight from the public schools junior training corps. The conditions are 10 shots each competitor at 200 and 500 yards. It was presented in 1861 by the third Lord Ashburton.

Ashburton Treaty. Treaty concluded at Washington in 1842 dealing with the boundaries of Canada and U.S.A., especially that between the prov. of New Brunswick and the N.E. state of Maine. Lord Ashburton acted for Great Britain and Daniel Webster for the U.S.A. The treaty provided for the cession of about seven-twelfths of the 12,000 sq. m. of disputed territory to the U.S.A., and the adoption of measures to suppress the slave trade.

Ashby-de-la-Zouch. Market town and parish of Leicestershire, England. It stands 21 m. N.W. of Leicester, and 118 m. N.N.W. of London by railway. The church of S. Helen has monuments to the Huntingdon family. Coal is worked and biscuits and soap are made. Market, alt. Sat. and Mon. There are remains of Ashby Castle, which figures prominently in Scott's *Ivanhoe*. It was held for the king during the Civil War and was demolished in 1648. It was for some time the prison of Mary Queen of Scots. Pop. 5,093.

Ashcroft, EDITH MARGARET EMILY (b. 1907). British actress, known as Peggy



Peggy Ashcroft,
British actress

Theatre in 1926 in *Dear Brutus*. In 1930 she appeared as Desdemona, with Paul Robeson as Othello, and in 1932 was engaged by the Old Vic-Sadler's Wells company and played a number of Shakespearian rôles. Her Miranda in *The Tempest* in 1940 was memorable. In 1939-40 she appeared in a revival of *The Importance of Being Earnest*; in 1943, in *The Dark River*. She was with the Gielgud repertory company at the Haymarket Theatre, 1944-45, playing the Duchess of Malfi. Later successful rôles were in *Edward, My Son* (London, 1947; New York, 1948); *The Heiress*, 1949.

Ashdown. Park and seat of the earl of Craven in Berkshire, England, 3 m. N. of Lambourn. As Aescandune or Assandune it may have been the scene in 871 of the defeat of the Danes by Ethelred and Alfred. In the neighbourhood there are several ancient camps and a cromlech, Wayland Smith's Cave.

Ashdown Forest. District in Sussex, England. It lies between Maresfield and E. Grinstead, and is the only remaining part of the immense forest known to the Saxons as the Andredsweald. Area, about 14,000 acres.

Asher. Eighth son of Jacob, by Zilpah, the handmaid of Leah (Gen. 30). The tribe of Asher was named after him. Possibly Asher was the name of a deity identical with Ashur, chief god of Assyria.

Asherah (pl. Asherim). Word usually understood to denote a pole or post placed by the Canaanites in the vicinity of an altar. The A.V. renders it grove or groves, altered to Asherah in the R.V. Asherah or Asherah is believed to have been a Canaanite goddess of fertility, who was succeeded by Astarte, and the pole or post her symbol. *Consult* Ex. 34; Deut. 7 and 16; Judg. 3; 1 Kings 14 and 18; 2 Kings 17, 18, 21, and 23; Jer. 17; Micah 5.

Ashes. Popular term for a set of five cricket matches played periodically between England and Australia, the side winning the greater number of matches being said to "win the Ashes." When Australia beat England at the Oval, Kennington, by seven runs on Aug. 29, 1882, the *Sporting Times* appeared with an epitaph in a black-edged border "in affectionate remembrance of English cricket," which concluded, "the body will be cremated and the ashes taken to Australia." In the following winter an English team was successful in Australia,

and some Melbourne ladies presented an urn with ashes to the visiting captain. This is now in the pavilion at Lord's. Up to 1938 English teams had been going to Australia in the winters following each leap year since 1924, and Australian teams coming to England in the other even-numbered years. After the break caused by the Second Great War the contests were resumed in Australia 1946-47 and in England 1948. The Ashes were in Australian hands continuously from 1934. *See Test Match*; also *illus.* p. 789.

Ashville. City of N. Carolina, U.S.A. The co. seat of Buncombe co., it is 210 m. W. of Raleigh, and stands at the junction of the Swannanoa and French Broad rivers, in the Blue Ridge, 2,350 ft. high. A popular health resort, it is served by rly., has tanneries, cotton mills, and timber works, and trades in livestock and dairy produce. It is an important educational centre. In the neighbourhood is Biltmore, the home of G. W. Vanderbilt. The Renaissance château, modelled on that at Blois, stands in grounds which originally covered 200 sq. m. Biltmore village is now a suburb of Asheville. Pop. 51,310.

Ashfield, ALBERT HENRY STANLEY, BARON (1874-1948). British business man and politician. Born



Lord Ashfield,
British magnate

at Derby, he spent his early years in the U.S.A. There he entered the railway world, becoming general manager of the United Railways of Detroit and of the Public Service railways of New Jersey. His success led to his return to England in 1907, to become general manager of the Metropolitan District and tube rlys., of the Underground group of companies including the London and in 1912 managing director General Omnibus co. Knighted 1914, he joined the Lloyd George govt., 1916, as president of the board of trade, and was coalition Unionist M.P. for Ashton-under-Lyne until 1920, when he received a barony. He was again managing director of the Underground group 1919-33, chairman of the L.P.T.B. 1933-47, then on the British transport commission. He died Nov. 4, 1948, leaving no heir to the title.

Ashford. Urban district and market town of Kent, England. It



Ashford, Kent,
arms

and an old grammar school. Ashford gives its name to a parl. co. div. returning one member. Market day, Tues. Pop. est. 22,300.

Ashford. Parish and village of Middlesex, England. The ancient Ekeford, it is 2 m. E. of Staines by railway, and is now largely suburbanised. Pop. 8,719.

Ashih-hê-Cheng. Town of Manchuria. Known formerly as Ai-so-ka, it is 26 m. by rly. S.E. of Harbin. It is a centre of trade for agricultural produce and has flour and beet sugar factories. Pottery, swords, and other relics of the Kin period have been found.

Ashikaga. Town of Japan, on Honshu island, 72 m. by rly. N.W. of Tokyo. It has important manufactures of silks and cottons. A famous school of learning is said to have been founded before the 9th century; restored in the 15th century, it contains a statue of Confucius. There is also a temple of the Shoguns. Ashikaga is the name of a period (15th cent.) in art. Pop. 43,896.

Ashington. A parish of Essex, England. The ancient Assandun, it is 2 m. N. of Rochford, and was the scene of Canute's defeat of Edmund Ironside, 1016.

Ashington. Urban district of Northumberland, England. It is 4 m. E. of Morpeth by railway, in a coal-mining district. Pop. 29,418.

Ashira. A negroid tribe in French Equatorial Africa. Occupying the hinterland S. of the Ogowe river, they speak the same language as the Ashango. They cultivate the plantain as their chief food. *See Negro.*

Ashkenaz. An ancient people of Armenia. According to Gen. 10

stands on the Stour, 14 m. S.W. of Canterbury, on the railway, and makes rly. materials, agricultural machinery, wheels, bricks and cider. It has a fine Perp. church

they were descendants of Japhet, the son of Noah. They spread along the shores of the Black Sea, and it has been suggested that the German Jews known as Ashkenazim are descended from them.

Ashland. City of Wisconsin, U.S.A. The co. seat of Ashland co., it stands on an inlet of Lake Superior, 55 m. by rly. E. of Superior. An important rly.

junction, it has large iron, steel, and boiler works, sawmills, and rly. repair shops. It is a summer resort, has various educational and state institutions, a good harbour with extensive docks, and ships iron ore and lumber. Pop. 11,101. There is also an Ashland in Kentucky; pop. 29,537.

Ashlar (Lat. *axilla*, small board). A term generally used to denote hewn and squared blocks of stone, as opposed to unfinished stone from the quarry. More particularly, ashlar is such stone used to face the surface of a wall composed of less durable materials. Plane ashlar is a hewn block so smoothed as to eliminate any marks of the tools with which it was cut: tooled ashlar, chiselled or pointed stones; and rusticated ashlar, more commonly called rusticated masonry, stones projecting from the joints.

Ashley, ANTHONY EVELYN MELBOURNE (1836-1907). British politician and biographer, usually known as Evelyn Ashley. Fourth son of the 7th earl of Shaftesbury, born July 24, 1836, and educated at Harrow and Trinity College, Cambridge, he was Palmerston's private secretary, 1853-65. In 1864 he helped to start *The Owl*, a pioneer society newspaper. Liberal M.P. for Poole, 1874-80, and Isle of Wight, 1880-85, he became under-secretary to the board of trade in 1880 and to the colonial office 1882-85. Of the standard biography of Palmerston, he finished in 1874 the third volume begun by Lord Dalling; two years later appeared vols. iv and v, of which Ashley was sole author. He died Nov. 16, 1907, at Broadlands, Romsey, which was formerly Palmerston's house, and is buried at Romsey.

Ashley, SIR WILLIAM JAMES (1860-1927). British economist, born Feb. 25, 1860. Educated at S. Olave's, South-



Ashford, Kent. High Street of the pleasant market town on the river Stour

wark, and Balliol College, Oxford, he became professor of political economy at Toronto, 1888-92, and of economic history at Harvard, 1892-1901. He then returned to England to organize a faculty of commerce, the first of its kind, in the new university of Birmingham. With great experience of contemporary commercial development in Europe and America he had also the belief that a university should provide vocational training, and his department, with its degree of bachelor of commerce, became a model. A supporter of tariff reform, Ashley served on government economic committees from 1915, and was knighted in 1917. His writings include *Introduction to English Economic History and Theory*, 1888-93, and *Economic Organization of England*, 1914. He resigned his professorship in 1925 and died July 23, 1927.

Ashmead-Bartlett, SIR ELLIS (1849-1902). An Anglo-American politician. Born in Brooklyn, New York, he came to England in boyhood and was educated at Christ Church, Oxford. He was an inspector of schools, 1874-77, and then a barrister. After visiting Bulgaria to investigate the "atrocities," he entered Parliament as Conservative M.P. for Eye, 1880, and from 1885 sat for Ecclesall. In 1885-86 he was civil lord of the Admiralty, and in 1892 was knighted. He was taken prisoner in the Greco-Turkish war of 1897, but was present at the front in the Boer War. He died in London, Jan. 18, 1902.

Sir Ellis's eldest son, Ellis Ashmead-Bartlett (1881-1931) was a well-known war correspondent during the Russo-Japanese conflict, 1904, and the First Great War, 1914-18. From 1924 to 1926 he was Conservative M.P. for N. Hamersmith. He died May 4, 1931.

Ashmole, ELIAS (1617-92). English antiquary. Born at Lichfield, May 23, 1617, he became a

solicitor, and as a royalist was captain of horse and comptroller of the ordnance during the Great Rebellion, and Windsor Herald after the Restoration. Although he declined the office of



Elias Ashmole,
English antiquary
Contemporary print

Garter king-at-arms, his chief work deals with *The Institutions, Laws and Ceremonies of the Order of the Garter*, 1672. In 1677 he presented

to his university, Oxford, the first public collection of antiquities in England, now in the Ashmolean Museum. One of the earliest English freemasons, initiated 1646 he was also largely interested in astrology and alchemy. He died May 18, 1692, and is buried in S. Mary's Church, Lambeth.

Ashmolean Museum. Building containing antiquities belonging to the university of Oxford.

The collection originated in the gift made by Elias Ashmole, and was long housed in a university building between High Street and Broad Street. In 1893-94 a new structure adjoining the Taylorian Institute at the top of Beaumont Street was erected to receive the main part of the collection, but the books and natural history exhibits were taken to the Bodleian and the University Museum respectively. The museum contains Egyptian, Greek, Roman, British, and other antiquities gradually added to Ashmole's gift.

Ashraf OR **ASHREEF**. Town of Persia, in Mazanderan province. It lies about 50 m. W. of Astrabad, and was once the residence of the kings and the favourite seat of Abbas the Great. It has a fair trade in silk and cattle.

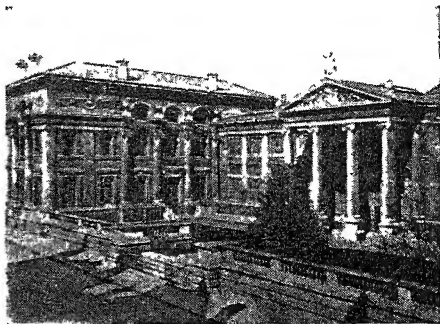
Ashridge. Locality of Hertfordshire, England. In a park here, 3½ m. N. of Berkhamsted,



Ashridge Park, Herts, endowed as a College of Citizenship founded in memory of Bonar Law

stood a house which, founded in the 13th century as a monastery, was seized by the crown at the Reformation and became the home of Edward VI, Mary, and Elizabeth. Owned by Lord Ellesmere, between 1800 and 1815 and subsequently by Lord Brownlow, the old monastic buildings were pulled down, leaving only a tithe barn and crypt which still remain. The present house, over 1,000 ft. in

length, was built in 19th century Gothic by Wyatt, 1808-15. In 1928, Urban Broughton purchased the property as a memorial to his friend Andrew Bonar Law (*q.v.*) and endowed it as a College of Citizenship, offering adult citizens of both sexes and all classes education in democratic citizenship on Conservative and constitutional lines. During the Second Great War Ashridge was lent to the



Ashmolean Museum, built for the collection presented to Oxford by Elias Ashmole

ministry of Health free of charge as an emergency hospital. Some of the deer park is National Trust property. At the golf course T. H. Cotton (*q.v.*) was long professional.

Ashta. Town of Bombay, India, on the right bank of the Kistna or Krishna, 180 m. by rly. S.E. of Bombay. A thriving agricultural town, it has a weekly market.

Ashtabula. City of Ohio, U.S.A., in Ashtabula county. It is situated on the Ashtabula river,

3 m. from Lake Erie and 55 m. by rly. N.E. of Cleveland. It imports immense quantities of iron ore, exports coal, and is engaged in shipbuilding and manufacturing. One of the worst American rly. accidents occurred here in 1876. Pop. 21,405.

Ashtaroth. Ancient city of Palestine. It is named in the Bible (Deut. 1; Joshua 9, 12, 13) as the capital of Og, king of Bashan, 6 m. from Abila, and has been identified with Ashteroth-Karnaim (horned Ashtaroth), Carnion, or Carnain; but Eusebius mentions Ashtaroth and Karnaim Ashtaroth as names of two villages between Adara (Edrei) and Abila, Karnaim Ashtaroth being in Bahan.

Ashtaroth. The plural of Ash-toreth, Hebrew name for the Sidonian goddess Astarte, referred to in the O.T. (1 Kings 11; 2 Kings 23). The plural is used because the later mythology made separate deities of her several manifestations. See Astarte.

Ashtead OR **ASHSTEAD.** Village of Surrey, England. Part of the Leatherhead urban district, it is 2 m. S.W. of Epsom and 5 m. N. of Dorking, and is served by Rly. and Green Line. It is a residential district noted for its woods. A Roman villa was discovered in Ashtead woods in 1925 and quantities of tiles, pottery, and other objects were brought to light. The church is notable for a 16th century east window. A 19th century mansion is now used to house the City of London Freeman's School.

Ashton, FREDERICK WILLIAM MALLANDAYNE (b. 1903). British dancer and choreographer. Born



Frederick Ashton,
British dancer
and choreographer

at Guayaquil, Ecuador, Sept. 17, 1903, he was educated at Dover College and trained as a dancer by Massine and Marie Rambert. He made his first appearance at

the Lyric, Hammersmith, in 1926, in *Riverside Nights*, and toured European capitals with Ida Rubenstein, 1927-28. In 1930 he appeared in *Marriage à la Mode* at the Arts, London, and produced for Marie Rambert during the same year for the Camargo Society. In 1935 he was appointed choreographer at Sadler's Wells. Ashton's productions include *Façade*, *Les Rendezvous*, *Rio Grande*, *Capriol Suite*, *Les Patineurs*, *The Wise Virgins*, *The Quest*, *Cinderella*.

Ashton-in-Makerfield. Urban district and market town of Lancashire, England. It is 4 m. S. of Wigan by railway, has coal mines and cotton mills, and among its manufactures are nuts, locks, hinges, files, and nails. Market day, Sat. Pop. 20,541.

Ashton-under-Lyne. A mun. and parl. bor. and market town of Lancashire, England. It is on the Tame, 6 m. E. of Manchester, and is well served by rlys. Cotton and silk spinning, dyeing, bleaching, iron-founding, and hat-making are the chief industries, and there are large collieries in the neighbourhood.

It has a 13th century church almost entirely rebuilt, but with old stained glass, a town hall, a Classical structure built in 1840, technical and art schools, a library, and a public park. The old manor hall, with prison, and the Gallows Meadow recall



Ashton-under-Lyne
arms

the feudal powers of the Asshetons, lords of the manor. On Hartshead Hill there is an interesting tower, 80 ft. high, which was formerly used for a signalling station. "Under lyne" refers to the situation below the frontier between Northumbria and Mercia. Stamford Park belongs jointly to Ashton and Stalybridge. Ashton returns one member to Parliament. Market days, Mon. and Sat. Pop. 51,573.

Ashurada. Island of Russia off the Persian coast, at the S.E. end of the Caspian Sea. Sandy and flat, it was uninhabited until 1844.

Ashurbanipal. King of Assyria 668-626 B.C. The Biblical Assnapper—Osnapper in R.V.—(Ezra 4), son of Esarhaddon, his campaigns were marked by much barbarity. He plundered Thebes, 666; sacked Babylon, 648; and destroyed Susa, 644. Under him Assyrian art and literature reached their zenith. See Assyria.



Ashurbanipal, King of Assyria,
offering before an altar four lions
slain by himself
British Museum

Ashurnatsirpal OR **ASHURNATIRPAL.** Name of three Assyrian kings. The greatest, Ashurnatsirpal III, 883-858 B.C., greatly extended the empire northward and westward. With the captives and tribute brought from Lebanon, Phoenicia, and elsewhere he rebuilt Calah, and erected luxurious palaces. He was succeeded by his son Shalmaneser III.

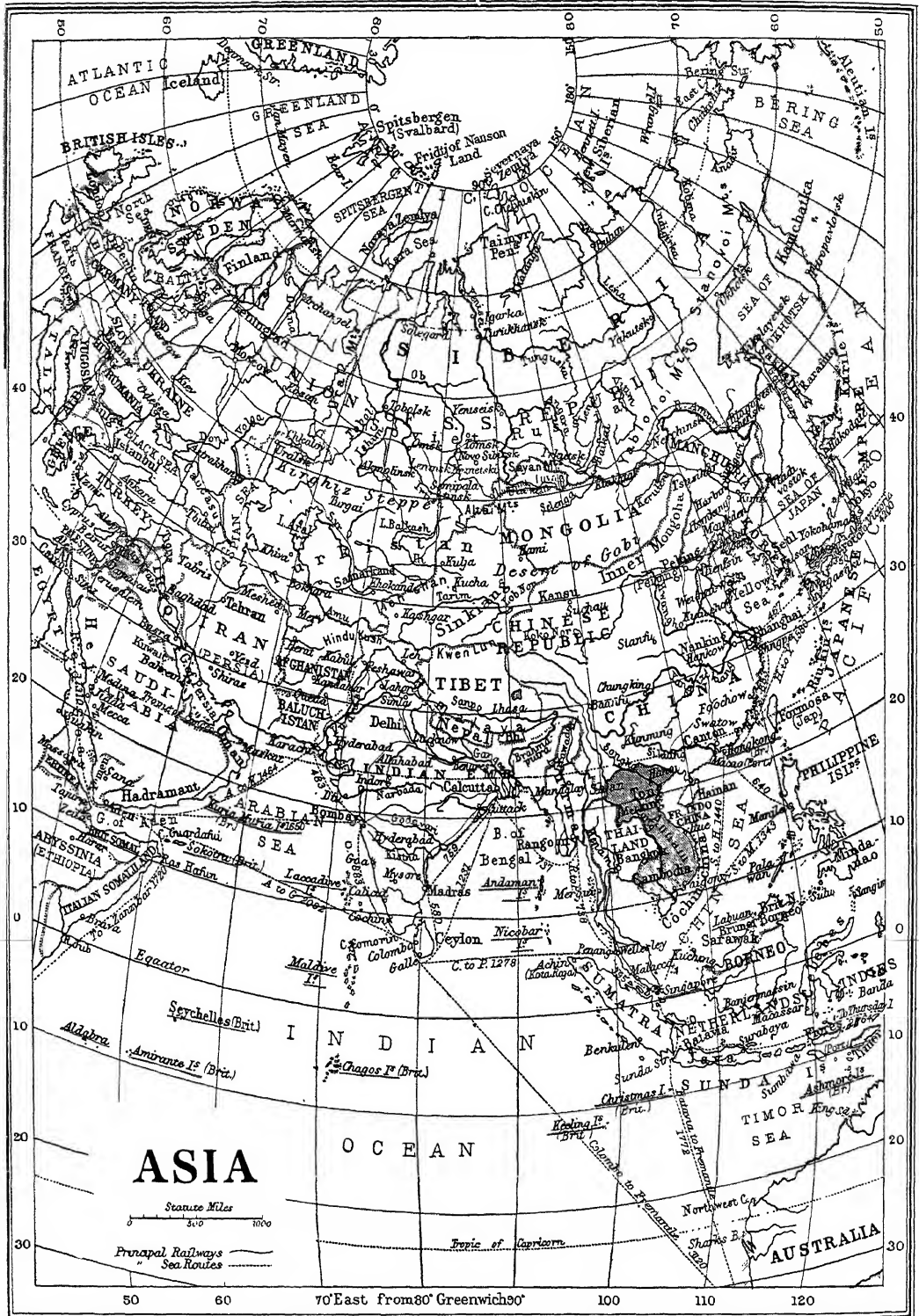
Ash Wednesday. Day observed in the Christian Church since the beginning of the 9th century partially, and since 1191 generally, as the first day of Lent. The name *dies cinerum* or day of ashes (Fr. *mercredi des cendres*) originated in the custom in the primitive Church of public penitents presenting themselves before the bishop and clergy of the diocese clothed in sackcloth and with naked feet. The seven penitential psalms were repeated, ashes were thrown upon the penitents, and they were expelled from the church, to be solemnly readmitted to Holy Communion on Maundy Thursday.

In the Roman Catholic Church the ceremony of taking the ashes on Ash Wednesday precedes Mass, and the ashes are of burnt palm-branches, blessed on the Palm Sunday of the previous year. These are placed on the altar, and the priest, after sprinkling the ashes with holy water, marks his forehead with them. Then the congregation approach the communion rails and kneel, and the priest marks the forehead of each with the sign of the cross with the ashes saying, *Memento, homo, quia pulvis es, et in pulverem reverteris* (Remember, man, that thou art dust, and to dust thou shalt return). In the Church of England the Communion Service replaced this ceremony in the 16th century.

Ashwell, LENA (b. 1872). British actress. The third daughter of Commander Pocock, R.N., she was educated in Canada and Switzerland, and studied at the Royal Academy of Music. Giving up music for the stage, on the advice of Ellen Terry, she made her début in 1891, became manager of the Savoy Theatre in 1906, and in 1907 obtained a lease of the Great Queen Street Theatre, Holborn, which she reopened as the Kingsway Theatre. One of her greatest parts was Mrs. Dane, in Mrs. Dane's Defence, first played in 1900. In 1908 she married Sir Henry Simson (d. 1932). During the First Great War she organized concert parties for troops overseas. She later founded the Lena Ashwell Players, and in 1924 took the Bijou Theatre, Baywater, renaming it the Century. Her publications include *Myself a Player*, 1936.



Lena Ashwell,
British actress



ASIA: SHOWING THE BOUNDARIES OF ITS COUNTRIES AS THEY WERE IN 1939

ASIA: GENERAL SURVEY OF THE CONTINENT

This general sketch is intended as an introduction to the articles on the countries of Asia: Arabia; China; India; Japan; Persia, and the rest. It also touches upon rivers, mountains, etc., about which fuller information is given under the several headings, e.g. Ganges; Hooghly; Himalayas; Pamirs; Caspian Sea, etc.

Asia, the largest of the five continents into which the world is divided, covers an area approximately of 17,300,000 sq. m., or over 1,000,000 sq. m. more than both the Americas combined. In old days large portions of Europe and Africa were included in Asia; the ancient geographers held that the Don, not the Ural, was its western limit, and it was usual to regard Egypt as an Asiatic appendage. The Asia of the Greeks was at first only part of the plains of Caesarea, but as their trade and colonies advanced they carried the use of the name with them.

On three sides the continent is bounded by great oceans, one of which is ice-bound. The Arctic to the N., the Pacific to the E., and the Indian, without a land barrier between it and the Antarctic, wash its shores, while on the W. a clearly marked frontier is provided in the Mediterranean, Black and Caspian Seas, the Caucasus, and the Ural mountains and river. Its greatest breadth from W. to E. (Suez to Bering Strait) is 6,700 m., and its greatest depth from N. to S. (Severo on the Arctic to Singapore) is 5,300 m. Within those limits it presents every variety of climate, soil, and scenery. It includes some of the coldest and some of the hottest lands of the habitable globe, some of the most productive regions and some of the most barren, some of the grandest scenery, as in the Himalayas, and some of the dreariest and least inviting, as in the sand desert of Gobi. It contains the loftiest peaks in the world, the most elevated plateaux where life is supportable, and depressed areas that have sunk lower than sea level.

Lofty Peaks of the Himalayas

Among the great mountain ranges may be named the Himalayas, with their extensions in the Hindu Kush and the Suleiman, the Kwen Lun, the Tien-Shan, the Altai, the Caucasus, and the Ural. Among these the loftiest peaks are to be found in the Himalayas, the famous snow mountains of the Hindus, the great natural defence of the plains of India against attack from the N. Godwin-Austen lies in the clump of peaks and glaciers N. of Kashmir, where the Mustagh furnishes the connecting link with the Hindu Kush. Here, within a comparatively recent period, ex-

plorers have discovered altitudes that were unsuspected not so many years ago. The permanent snow-line S. of the range is 15,000 ft., but to the N. it is as high as 18,000 ft.

The Kwen Lun range lies N. of the Himalayas and in a general sense parallel with them. It stretches from the Pamir plateau to the Hwang-ho, and forms the northern boundary of the great Tibetan tableland, which lies at an average height of 16,000 ft. above sea level.

The Tien-Shan, or Celestial Mountains of the Chinese, is a third range following very much a parallel line with the two just named. It serves as a boundary for Chinese Turkistan (or Sinkiang), and more particularly divides Kuldja from the Takla Makan desert. The fourth, the Altai, separates Siberia from China.

The Great Deserts

Among other mountain systems is the Caucasus, which was well known to the Greeks and figured largely in their mythology. It forms a natural barrier between Asia and Europe in the W., joining the Black and Caspian Seas as the northern boundary of that portion of Asia which projects to the Mediterranean. The Caucasus range is remarkable for the narrow and difficult defiles, few in number, which traverse it, and for the lofty and imposing peak of Elburz (18,570 ft.). The Ural mountains have always, at least in modern times, been regarded as the line of separation between European and Asiatic Russia. They now cut across Sverdlovsk prov. They contain no exceptionally high peak.

The deserts of Asia, too, are on the grand scale. That of Gobi or Shamo, the sea of sand, forms a great natural defence for China on the W. It rivals the Sahara in size, and if its offshoots in N. Tibet are included, far exceeds it. There are further the deserts of Arabia, the great salt desert of Persia, those of Seistan, Baluchistan, Rajputana, and Khiva, and that of Syria, which closes the land route from the Persian Gulf to the Levant. Many of these deserts are the sepulchres of departed civilization.

Asia is certainly not less remarkable for its great rivers than for its lofty mountains. India possesses in the Ganges, the Indus, and the Brahmaputra three of the most important streams of the continent,

and the Irawadi, which for its navigable course lies altogether in the Burma Union, is worthy of being classed with them. In Indo-China, to the E. of Burma, are the Mekong and the Salween, which have their sources on the Tibetan highlands. The great rivers of China, the Yang-tse-kiang and the Hwang-ho, outdistance those of India. The latter has been rendered useless for access to and from the sea by sandbanks; the former is the busiest water-route in the whole world, although the bulk of the traffic is still conveyed in native junks. The Si-kiang, or Chu-kiang, and the Amur are also rivers of the first magnitude.

All the above rivers flow into the Indian Ocean or the Pacific. Of those that seek the Arctic, the Ob, with its great affluent the Irtysh, the Yenisei, and the Lena are among the most notable waterways of the continent, and provide communication with the remoter provinces of Siberia as long as navigation remains open, about four months of the year.

Rivers Famous in History

Four rivers stand apart—more famous in history than for their present usefulness. They are the Amu Daria or Oxus, Syr Daria or Jaxartes, the Tigris, and the Euphrates. The Amu Daria, which affords Afghanistan a natural northern boundary, flows like the Syr Daria into Aral, and has been used by the Russians to a moderate extent as a channel of communication, but notwithstanding its being fed by the snows of the Hindu Kush, its volume is scanty, much of the adjacent land is desert, and there is only enough water left in its lower course to sustain the oasis of Khiva. The Syr Daria, coming from the Tien-Shan, waters the Turkistan and Ferghana regions, and is exclusively used for irrigation. As both these rivers are shrinking in volume, much of the water being lost by percolation, their utility shows no likelihood of expansion. It is otherwise with the Tigris and the Euphrates, especially the latter, which only need engineering skill and attention to become great arteries of commerce once more.

Though Asia is well endowed with rivers she is singularly poor in lakes and inland sheets of water. Moreover, many of these are

shrinking and will disappear in course of time. Baikal is the one lake of large size and great depth. Its waters are fresh, whereas almost all the others are salt or brackish. Balkash and Issyk Kul are the two other lakes within Russian territory, if Aral be not included. China has few lakes, Tungting being the only one of any importance. India is even worse off.

Fauna and Flora of the Continent

The lakes of the Tibetan plateau, Tengri Nor, Lob Nor, and Koko Nor, resemble salt marshes amid the sands, and in this respect Persia is on the same footing, with the Hamoon marsh, once called the Seistan lake. Asiatic Turkey has Lake Van and smaller lakes of the same character, all salt or brackish. Arabia has none at all. In Palestine are the Dead Sea and the Sea of Galilee. There are but few islands. The Japanese islands and Sakhalin, Ceylon, Formosa, and Hainan are the largest, excluding Indonesia.

The fauna and flora of the continent are both remarkable. Most of the world's animals are found here. There is hardly a tree, shrub, or plant that is not represented, and many, such as the tea, indigo, cinnamon, and spice trees, are not to be found anywhere else. Among forest trees the teak, the palm, and the cedar are identified with the East. India and Indo-China stand at the head of Asiatic countries in this respect. In addition to those named they have the oak, the walnut, the banyan, the cinchona, etc., and the Indian forestry department is charged with their development and preservation. Cinchona was introduced from Bolivia about the year 1860, tea from China about thirty years later, coffee, cotton, and the sugar-cane have long been cultivated, and the poppy is the monopoly of Bengal and Malwa. The camphor-tree flourishes in the island of Formosa. The rose-tree is to be met with in all the countries S. of Siberia, and the states of Central Asia have ever been famous for their orchards. India and Siberia are great wheat-producing areas, and China, Burma, Siam, and Japan, as well as parts of Bengal, are great producers of rice.

Among the fauna of the continent may be named the lion, the tiger, the leopard, the elephant, the camel, the dromedary, the wild horse, the wild ass, the yak, the argali, the buffalo, and the reindeer, in addition to domestic animals. The Pamir and Mustagh are the home of the great horned sheep,

Ovis poli. Siberia and the northern districts of Manchuria are noted for their fur-bearing animals, e.g. the sable, ermine, marten, and foxes of all colours, but the Russian hunters in the last three centuries have gone far to exterminate them.

Finally, Asia is celebrated for its mineral wealth. Gold, silver, and precious stones, the diamond, the ruby, the emerald, and the pearl, were, and still are, found within its limits; and if coal has only been exploited in later days it has not been because it was not there in abundance, but only because facilities for transport were lacking. Not for one reason but for many did the wealth and resources of Asia appeal to the imagination of the great minds of the Renaissance. When a poet sought splendour in his imagery he turned to Asia; thus Milton says:

High on a throne of royal state, which far
Outshone the wealth of Oimuz and of Ind,
O! where the gorgeous East with richest
hand
Showers on her kins barbaric pearl
and gold,
Satan exalted sat

Climatic and Racial Diversity

As Asia extends from the Arctic circle to the equator every variety of human existence may be found within it. At one extremity men cover themselves in skins and pass six months of the year underground for warmth; at the other, cotton provides the only garment, and many try to do without any at all. There is an equally wide range in the spheres of mental capacity and of social comfort. The primitive Aino and equally primitive Naga stand at the bottom of the scale, at the top of which pose the Indian Brahmin and the Chinese Buddhist, endowed with intellects as keen and subtle as any found in the western world. Socially there are men in the lowest stage who thrive on offal—cannibalism alone is unknown—and in the highest who are as epicurean as a French gourmet. Thickly populated as parts of Asia are and always have been, there is a sufficiency of food and nourishment for the inhabitants, and this is the more remarkable because the most is not made of the productive possibilities of the continent. Owing to drought in the one case and floods in the other, however, famine is periodic in India and China.

Asia is not only the largest, but the most densely populated of the five continents, and whatever deductions may be made it certainly contains more than half the population of the whole world. The estimates of 1939 placed the total at over 1,100,000,000. China had

at least 422 millions, India 389 millions, Japan nearly 100 millions. In Indo-China are some 24 millions and in Arabia perhaps 10 millions. India, China, and Japan represent the centres of dense and ever increasing masses of the human race. It is usual to divide these races into blocks, distinguished by their religions, thus: Buddhists, 150,000,000; Mahomedans, 160,000,000; Confucians and Taoists, 350,000,000; and Hindus, 230,000,000. The balance are Shintoists, animists, etc. The chief Asiatic races are most prolific.

The great states of the continent are India, Pakistan, China, Japan, Soviet Asia, Indonesia, and Turkey. Minor independent states are Iraq, Saudi Arabia, Persia, Afghanistan, and Siam. While much of Asia is self-governing or possesses native rule, a large part of the continent and perhaps a fifth of the population are under foreign sway. The foreign ruling systems are British, French, Russian, Dutch, and Portuguese. In extent of territory Russia stands first with over 6,000,000 sq. m., but the population is under 40,000,000. About 2,000,000 sq. miles with over 400,000,000 souls are associated with the British Commonwealth, and some 300,000 sq. m. with 22,000,000 persons with the French union. Portugal owns 9,000 sq. m. with about 1,000,000 inhabitants.

Early Civilizations and Conquests

This foreign domination is all the more remarkable, and perhaps all the more certain to prove transitory, because Asia, S. of the Altai, was the original source of all our civilizations and arts. The arts of painting and weaving in all its forms were known and practised there at remote epochs. The secret of chinaware only became known in Europe in the 18th century; the inlaid work of the Japanese is still unapproached. Nor is it only in art that Asia has stood pre-eminent. The practical task of government has been defined in its moral and political aspects. The code of Confucius and the laws of Manu cannot be surpassed.

The earliest records of what was known as Asia relate to only a small and contracted region. They reveal no suspicion of the vast continent behind. The Jews and the early Greeks had a limited horizon, not extending beyond the Caucasus and the Persian Gulf. When it was enlarged, the outer realms of Asia were comprehensively described as Scythia to the N. of the Caspian, India to the E. of Persia, and Serica, a remote



Asia. Map illustrating the distribution over the continent of natural resources, mineral and other, and of the agricultural and manufactured products

country corresponding more or less with China.

Ptolemy, writing in the 2nd century of the Christian era, was the first to refer definitely to the sub-divisions of Asia somewhat as they are now known; but the campaign of Alexander on the Indus and in the Punjab, in 327-325 B.C., had already made India well known, and left behind it a permanent memorial in the Bactrian kingdom of the Hindu Kush.

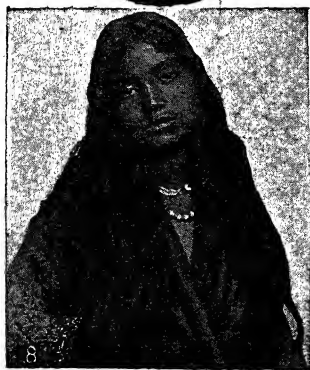
Egypt was, in the time of Ptolemy as it is now, a sort of half-way house to India, and it is even probable that some of the trade in silks, jewels, and gold-dust was carried on in galleys from India, if not to Suez, at least to Muscat and other places on the Persian Gulf. But the part taken by Egypt in making Asia known to the

western world was small compared to that of the Arabs, who, in the 7th and 8th centuries, carried the cult of the Koran at the sword's point far into the continent. The caliphs, of whom Haroun-al-Raschid was the most magnificent, also patronised trade, and their barques found their way to the Sunda Isles, where Arab influence is still in evidence; while before 900 their merchants even reached the coast of China. While on land they were putting an end to the Parsi dynasty in Persia, and planting their colonies and power on the frontier of India preliminary to its invasion by Mahmud of Ghazni, they were posing at sea as powerful traders.

The Mahomedan conquerors and traders first began that penetration by the west which was com-

pleted in the 19th century, when the barriers of China were broken.

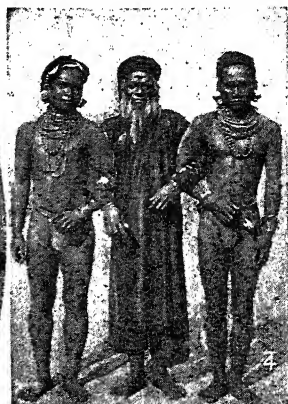
The triumph of the Mahomedans would have been greater but for the appearance of the Mongols, who carried out a counter-move from E. to W., which overwhelmed all human obstacles that attempted to bar their way. It was early in the 13th century when this race, having occupied a large part of Northern China, began the aggressive movement which eventually carried them to the Adriatic and the Levant. In their brief career in Europe they conquered Russia, Hungary, and the principalities eventually formed into the Turkish empire. These triumphs were ephemeral, and no attempt was made to retain anything W. of Russia. But in Asia they not merely overthrew the caliphs;



1. An elderly Circassian from the Caucasus. 2. Beduin sheikh of the Syrian desert near Palmyra. 3. A typical merchant from Persia. 4. Armenian woman wearing the national headdress. 5. Old man of the Upper Yenisei basin, in Krasnoyarsk, Siberia. 6. A Punjabi

and his wife. 7. Miao woman, Siam, wearing the curious national headdress, which is formed mainly of bamboo and beads. 8. A Ceylon beauty. 9. Bengal dancing girl. 10. Village youth of Burma, showing the remarkable tattooing of the thighs

ASIA: MEN AND WOMEN OF ITS DIVERSE LANDS FROM SYRIA TO SIAM



1. Two javanese women. 2. Chinese official or high rank, governor-general of the two Kwang Provinces. 3. Typical Manchu matron, Manchuria. 4. Native sorcerer arm-in-arm with two Moïs chieftains, Cochin

China. 5. Japanese geisha. 6. Group of Tibetan Buddhist nuns. 7. Chinese lady, of Shanghai. 8. Typical Durbet tribesman Mongolia. 9. An inhabitant of Yakutsk A.S.S.R. 10. Korean bride and bridegroom

ASIA: TYPES OF RACES IN ITS NORTHERN AND FAR EASTERN COUNTRIES

they founded dynasties in Persia, Turkistan, and Afghanistan which eventually became merged in the empire of the Great Mogul in India, as well as in China, where the Yuen dynasty held sway during three centuries.

While the Mongol outpouring is interesting as a manifestation of Tartar power, in resentment perhaps for the encroachment of Islam, it was also noteworthy for bringing the existence of Asia home to the imagination of Europeans in a new sense. The campaigns of Charles Martel and Charlemagne had made them acquainted with the Saracens, and the Crusades had brought them face to face with the same foe in Syria and Palestine; but the Mongols were a different race, coming from a distinct and previously unknown part of Asia, and in such numbers as to make them seem as countless as the sand.

Papal Mission to the Mongols

At the worst moment, when Italy seemed to lie open to the invader, the pope declared a crusade against the Tartars and sent an urgent call to France and England, among other countries, to come to the aid of Christendom. But when the great Mongol leader, Batu, suddenly retreated on learning of the death of the Khakhan Ogotai, and Europe was able to breathe again, the pope changed his purpose, and decided to make an effort to convert this formidable race to Christianity. In 1243 he sent John Carpini, a Franciscan friar, on a mission to Karakorum, the Mongol capital, where he was present at the election of Ogotai's successor. He was treated with distinction and returned in safety. He made no converts, but he brought back the first authentic details of Tartary and China.

Fifteen years later Louis IX of France sent another priest, a Fleming named Rubruquis, on a similar mission, but he was instructed to attend to political as well as religious matters. He also brought back further particulars of the Tartar power and system, in this sense completing the work of Carpini; but there were no other results, and China would have remained comparatively unknown but for the remarkable visit of Marco Polo, who returned to Italy in 1295 after having resided in China for seventeen years. To him we owe not merely the first account of that country in any detail, but also the first mention of Japan, which had just successfully repelled and beaten off a Mongol invasion.

These travellers' tales whetted the desire of the trading nations, then confined to the Mediter-

anean, to tap the wealth of the Far East, but there was no way thither except overland, and navigation beyond circumscribed limits was impossible until the use of the mariner's compass enlarged the prospect for overseas voyages. The story may be true that Marco Polo brought the invention, or rather the application of it, from China, where it was said to have been known from an early period, and where it was certainly in use several centuries before the Christian era.

But the great discovery of all was that of the ocean route to the East. It was not until the voyage round the Cape by the famous Portuguese navigator, Vasco da Gama, in 1497, that Europeans learnt that the coasts of Persia, India, Indo-China, and China were accessible to their ships. It was in accordance with the spirit of the age that the discoverers should claim a monopoly. The Portuguese established themselves in the Persian Gulf at Ormuz, in India at Goa, and in China at Tamang and Macao, and they enjoyed forty years' start of all their rivals. Then followed the Spaniards, and from 1580 to 1640 the two nations were under the same sovereign. But in the meantime more formidable competitors had arisen in the Dutch and the English. The former established themselves in Java and the latter in India, both events occurring in the year 1612. After two hundred years of more or less keen rivalry the positions remained relatively unchanged. The British consolidated theirs in India, the Dutch theirs over the Sunda Isles, known to them as the Dutch Indies; while the Portuguese retained only the relics of their great discoveries in Goa and Macao, and the Spaniards forfeited all that was left to them when they ceded the Philippines to the U.S.A.

Birthplace of the Christian Religion

The influence that Asia has exercised on the life, culture, and religion of Europe has been so immense and in some respects so subtle as to defy estimation. In the earliest period of Europe's history it was the influence of but a small part of S.W. Asia, and there is nothing on record to show that at any time the older civilizations of India and China affected in the least, much less shaped, European evolution.

Perhaps it is not unreasonable to believe that those older systems had at some unknown period of human existence produced the civilizations in Assyria, Egypt, and Persia, and that they in their turn reacted on the systems of

Greece and Rome through which the light of Asia reached Europe. Of all the influences the one which Europe proceeded to assimilate and absorb with the most complete thoroughness was that of religion. It is a supremely important fact in human experience that Europe took its religion, not from a world-empire, not from any of the five great monarchies wrapped in luxury and idolatry, but from a small pastoral people who never attained any great material power, and whose name even might have passed into oblivion if Christianity had not accepted their national history as the Bible on which all religious teaching and instruction reposed. In this sense, then, the influence on Europe of Palestine or Judaea, the Holy Land not of the Jews but of the Christians, was greater, and has proved more enduring than that of the Great Powers and political entities which Asia has known, and which probably preceded in point of time the cosmogony Europe has been led to accept.

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Asiago. Town of Italy, in the prov. of Vicenza. The chief town of the district known as the Seven Communes, it lies 25 m. by rly. N. of Vicenza, at an alt. of 3,280 ft. It has a museum of antiquities.

Asiago Plateau. Name given to a series of battles in the First Great War, fought between the Austrians and the Italians, Nov., 1917–Nov., 1918. The Austrians under Conrad von Hotzendorf were trying to force the line of the lower Piave by repeating the successful break-through which had won Caporetto (*q.v.*). Beginning their drive on Nov. 10, 1917, they took Asiago, attacked Monte Longara, and heavily pressed the Italians, who beat them off around Monte Castelgomberto. The line was hammered with little success for a fortnight. On Dec. 2 British and French troops joined the defenders but were not attacked. A renewal of the battle on Dec. 4 brought intense fighting and to the Austrians success at Badenece and Castelgomberto, where they took 15,000 prisoners. The fall of Sisemol to the Austrians led to another pause. Over Christmas, until snowstorms broke off the battle, there was further action in the Asiago sector, Melaga and the Col del Rosso several times changing hands. The Italians gained a local victory and took 2,600 prisoners on the Col. Jan. 28–29, 1918.

Austria Launches an Offensive

In mid-June the Austrians began a great offensive from the Val Lagarina to the sea, and also undertook operations on the W. side of the Trentino. On the 15th they attacked from S.W. of Asiago to the Brenta, from the Brenta to E. of Monte Grappa, and from the Montello to below San Dona di Piave, a front of about 45 m. The whole effort, for which a mass of artillery was concentrated, was directed by General Borovitch, with von Hotzendorf in command of the assault on both sides of the Brenta. On the W. of the Brenta stood the Italian 6th army, under General Montuori, consisting of Italian, British, and French troops. The British force, commanded by the earl of Cavan, was made up of the 23rd and 48th divisions. The French held the line between Italian troops in the Frenzela district, immediately W. of the Brenta, and the British, who were concentrated on the hills facing Asiago from the S.

The enemy made progress, taking the Col del Rosso and Costalunga, and delivered a powerful

assault at the Pizzo Ravea, 1½ m. W. of Valstagna, on the Brenta. The centre of the severest fighting was the Pizzo Ravea, which was taken and lost several times during the three days' struggle, but finally was lost by the enemy, who also was driven out of Sasso. The Austrian attack on the British 23rd division was entirely repulsed; the attack against the 48th division had some success at first, taking about 2 m. of its front.

Both British divisions assailed the Austrians on the 16th and took upwards of 1,000 prisoners and several guns from the enemy, whose losses in killed and wounded were put at 5,000. By the evening of June 17 the battle here was already over, with this part of the general Austrian offensive a complete failure.

The effect of Italy's victory was profound. In Austria it led to riots, and in Hungary to a serious attempt at a general strike. To the Allies on the western front it was of first importance, as it allowed Foch to use there his army of manoeuvre, which hitherto he had kept in reserve for eventualities between the N. Sea and the Adriatic. (*See* Monte Grappa.)

British Occupy Asiago

Beginning about Oct. 28, a final attack on the Austrians on the Asiago Plateau was made by the Italian 6th army, including the 48th British division, under Maj.-Gen. Sir H. B. Walker, the whole commanded by General Pennella. On Oct. 30 the British occupied Asiago; they stormed Monte Catz on Nov. 1; on that day the Italians advanced N. of the Monte di Val Bella, S.E. of Monte Sisemol, and progressed W. of the Brenta; by Nov. 2 the offensive was general along the plateau. The

Italians crossed the Assa and took Monte Longara and Monte Baldo on the N. edge of the Seven Communes. On Nov. 4 the leading British companies were on the outskirts of Trent, and in this area, up to the armistice granted by the Allies to Austria on that day, they had captured over 20,000 prisoners and 500 guns. Fighting ceased that day at 3 p.m.

Asia Minor. Name given to the peninsula forming the W. extremity of Asia. It was called by the Greeks Anatolia and later by the Turks Anadolı, meaning the rising of the sun. It is now practically continuous with Asiatic Turkey. Its shores are washed on the N. by the Black Sea, on the W. by the Aegean, and on the S. by the Mediterranean. On the N.W. the sea of Marmara with the Dardanelles or Hellespont and the Bosphorus form the historical division between Asia and Europe. The E. boundary has no fixed delimitation, but is usually regarded as extending from the Gulf of Alexandretta, along the Alma Dagh to Erzingan on the Euphrates, continuing thence to the Churuk Su, whose course is followed to the Black Sea. Its greatest length is 725 m., the extreme breadth 415 m., and its area nearly 200,000 sq. m.

Orographically, Asia Minor is an elevated peninsula comprising series of plateaux varying in height from 2,500 ft. to 4,500 ft., and falling away gradually from W. to E. It is buttressed on the S. by the Taurus range, which extends from near the Euphrates into the Aegean Sea, and is flanked on the N. by an unnamed and broken range which follows the S. shore of the Black Sea and varies considerably in altitude. Many smaller ranges



Asia Minor. Map of the great peninsula, bounded north by the Black Sea, west by the Aegean, and south by the Mediterranean



Asia Minor. Strange geological formation found in the volcanic plateau near Mt. Argæus. Caves cut in the soft lava are used as habitations
Photo Sir William Ramsay

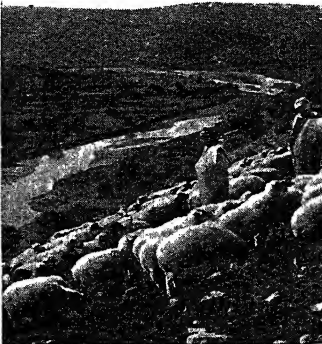
between these larger ones transversely intersect the plateaux.

Among the best known summits are the volcanic Argæus Dagħ, 12,650 ft., the culminating height of Asia Minor, lying W. of the Anti-Taurus; Bulgar Dagħ, 11,400 ft., in the Taurus; Mount Ida, 5,749 ft., at the base of which stood Troy; and Olympus, 7,600 ft., not that of Greek legend. Many passes cross the Taurus and Anti-Taurus, including the historical Cilician Gates, through which marched the armies of Cyrus and Alexander the Great. Though several of the rivers are of considerable volume, they are generally of little importance, many having no sea outlet, and few only being navigable for short distances by small boats. The largest flowing to the Black Sea are the Yeshil Irmak, the Kizil Irmak, the Churuk Su, and the Sangarius. The Aegean Sea receives the waters of the Sanabat and the Menderes, and the Geuk Su; the Sihun and the Jihun discharge into the Mediterranean. The plateaux, largely composed of sandy deserts, salt steppes, and marshes, contain numerous salt and fresh-water lakes, the largest, the saline Tuz Gol, which is 55 m. long and part of the year almost dry.

The climate is very varied. In the N. the heat of summer is damp and the winters are cold. The plateaux have long cold winters and oppressive summers, but on the W. and S. coasts mild winters are experienced, and although the heat is intense in summer it is tempered by the sea-breezes. In some parts, especially on the Black Sea littoral, malaria is prevalent.

The mountains are heavily clothed with forests of fir, pine, beech, oak, cedar, and other trees, their growth being densest on the highlands of the N. The products of the coast lands, which vary according to climate, include the vine, apple, pear, olive, orange, and lemon; the plateaux yield wheat, and excellent crops of rice and other cereals are obtained in the valleys. In addition, cotton, gum, opium, liquorice, saffron, and tobacco are cultivated, but agriculture is undeveloped. Wild animals are numerous, and include the bear, wolf, boar, hyæna, lynx, and leopard; among domestic animals are the camel, buffalo, horse, ass, and the Angora goat, the last being extensively reared for the production of mohair.

There are industries in the larger towns, the chief manufactured articles being carpets, mohair, silks, cotton, wine, and tobacco; and these, with cereals, fruit, olive oil,



Asia Minor. Pastoral scene near the R. Menderes, the ancient Scamander

and opium, are the leading exports. Imports consist chiefly of cotton stuffs, woollens, coffee, hardware, coal, petroleum, and various manufactured articles of domestic use. The mineral wealth is considerable, but not yet fully exploited; products include coal, lignite, cement, chrome, sulphur, and copper.

The Anatolian Rly. (*q.v.*), together with its local branches, is the chief means of inland transport. The original main line extends from the Bosphorus to Konieh, whence the Berlin-Bagdad Rly. (*q.v.*) continues to the Caspian Sea.

The population, estimated at upwards of 16,300,000, is mixed. Ottoman Turks are the predominating race; Armenians, greatly reduced by massacres, Greeks, Jews, and Kurds form the larger portion of the remainder. The industrial element is represented by the Greeks and Armenians, who, with the Jews, are the principal land-owners. Turkish is the official language, but many other tongues are spoken, and Mahomedanism is the religion mostly professed. Muslims long paid small heed to education, but increasing opportunities are being provided and taken for study. Izmir is one of the chief ports of Asia Minor; others are Trabzon, Sinope, Uskudar, Adalia, and Mersina. The other largest towns are Ankara (Turkey's new capital, planned by Kemal Atatürk on Western lines), Adana, Bursa, Eskişehir, Gaziantep, Konieh, and Kaisariyeh.

Coming of the Turks

Its peculiar geographical situation explains the history of Asia Minor as the scene of continuous struggles between the East and West. In earliest historical times it was inhabited by non-Aryan-speaking peoples, about whom, apart from the Hittites, who established their capital at Boghaz Keui, little is known. The conquests of Alexander the Great and the Romans were preliminary to the introduction of western civilization, which was greatly assisted by the preaching of Christianity, but the coming of the Turks after the overthrow of the East Roman emperor, Romanus IV, in 1071, and further nomadic invasions in the following four centuries, reduced the country to a state of decay from which it is now making slow recovery.

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Asiatic Society, ROYAL. Association founded in 1823 for the investigation and encouragement of science, literature, and the arts in relation to Asia. It holds meetings, issues a quarterly journal, offers prizes for essays, etc., in schools, and collects a suitable library. Its offices are 74, Grosvenor Street, London, W. The Society of Biblical Archaeology was amalgamated with it in 1918.

Asiento (Span. *asentar*, to place, or make a contract). Agreement signed between Great Britain and Spain in 1713. The supply of slaves for the Spanish colonies in America, previous to 1713, had been in the hands of the Genoese and then of a French company. In 1713, when the War of the Spanish Succession came to an end, the privilege was made over to the British for thirty years. Each year 4,800 slaves were to be sent to America by British merchants. These merchants were also allowed to send each year to S. America one ship filled with their wares.

For a time the South Sea Company worked the contract, and it was not without its influence on the South Sea Bubble. By various tricks more goods were sent to America than the treaty allowed, and this caused much trouble between the two countries. At length war broke out, and when this came to an end in 1748, the Asiento was renewed for four years. Shortly afterwards Spain paid Britain £100,000 and it was cancelled.

Asinara. Island off the N.W. coast of Sardinia. It is about 10 m. long, and forms the W. shore of the Gulf of Asinara.

Asir. Territory of Arabia. It lies between the Hejaz and the Yemen, on the E. shore of the Red Sea, and is inhabited mainly by mountaineers. It has many fertile valleys which produce dates, figs, and other fruits, and cotton. Formerly ruled by an ameer of the Idriisi family, in semi-independence of Turkey, it was annexed to his dominion of Saudi Arabia by Ibn Saud in 1933. See Hejaz.

Asirgarh OR ASEERGHUR. Fortress of the Central Provinces, India. It is 87 m. S.S.E. of Indore, and stands 850 ft. high, on a detached hill of the Satpura range. Captured by Akbar in 1600, it was surrendered to the British in 1803 and 1819.

Askalon. Variant spelling of the name of one of the five chief cities of the Philistines. See Ascalon.

Askari (Swahili, soldier). Native soldier enlisted in the E. African territories. The term is



Askari. E. African native soldier

often erroneously applied to any native in Africa officered and trained by Europeans. Askaris were first enlisted in the native constabularies raised in Lagos in 1863. They were employed by both Great Britain and Germany in E. Africa during the campaigns of 1914-1918 and also by the Italians in the conquest of Abyssinia in 1936. In the Second Great War Askaris took part in the Middle East as well as the Burma campaign. See King's African Rifles; Royal West African Frontier Force.

Aske, ROBERT (d. 1537). Leader of the English Pilgrimage of Grace. A lawyer belonging to an old Yorkshire family, when the popular discontent at the suppression of the smaller monasteries developed into insurrection, he was chosen as leader. York was occupied Oct. 16, 1536, and shortly afterwards all the N.E. coast from Newcastle to Hull was organized for military defence. On Oct. 20 Pontefract Castle surrendered to Aske, who proposed to lead the Pilgrimage of Grace to London. Hostilities with the troops commanded by the duke of Norfolk were avoided by Aske advising his followers to return home on the promise of pardon from the king.

Aske was invited to London by Henry VIII under a safe-conduct pass, and returned to Yorkshire in Jan., 1537, with the promise from the king that a parliament should be held in York. After persuading the rebels led by Sir Francis Bigot in E. Yorkshire to disperse, Aske wrote to the king pointing out the disturbed state of the N. of England. He was thanked for his services, again invited to London, and in April arrested. He was then tried for high treason, and in July was hanged at York, in spite of having obtained promises of pardon from Henry VIII and Cromwell. See Pilgrimage of Grace.

Askew, ALICE AND CLAUDE (d. 1917). British novelists. Claude Arthur Carey Askew and his wife, Alice J. de C. Leake, were married in 1900 and in 1904 published the first of the long series of stories that they wrote in collaboration. During the First Great War they were engaged in work on behalf of the Serbians; and when returning to Corfu on Oct. 5, 1917, their steamer was sunk by an enemy submarine, both losing their lives. Their numerous novels, mostly of a dramatic and sensational nature, included *The Shulamite*, 1904, a dramatised version of which was produced at the Savoy Theatre, London, in 1906; *Anna of the Plains*, 1905; *Rod of Justice*, 1910; *Destiny*, 1911.

Askew, ANNE (c. 1521-46). An English Protestant martyr. The younger daughter of Sir William Askew, of an old Lincolnshire family, she was born at Stallingborough, near Grimsby. Having parted from her husband, to whom she had been married against her will, she went to London, where in 1545 she was examined for heresy and discharged through the influence of Bishop Bonner. In 1546 she was again examined, and after long arguments with the Council, in which she readily answered every interrogation but refused to change her views, was burnt at Smithfield, July 16, 1546.

Askey, ARTHUR BOWDEN (b. 1900). English comedian. Born at Liverpool, June 6, 1900, he was eight years in the civil service before becoming a professional comedian in 1924. Broadcasting, especially in the serial *Band Waggon* (1938-39), brought him wide celebrity, and he subsequently starred in films and musical plays.

Askhabad OR ASKABAD. Capital of the Turkmen Soviet Socialist Republic. It stands at the N. base of the Kopet Dag, 345 m. S.E. of Krasnovodsk on the Transcaspian Rly. There is communication by motor road with Meshed in Persia. It has a museum and technical school, and since the Russian conquest of 1881 has become an important commercial centre, with tanning, brickmaking, and other industries. Pre-war pop. 126,580. An alternative and historic name is Poltortsk.

Askja. The largest volcano of Iceland, near the centre of the island. Its crater is 34 sq. m. in area, more than 700 ft. deep, and 4,633 ft. high, and has a hot-water lake 5 m. in circumference. Intermittently and sporadically active, its old lava floods cover an

area of 1,500 sq. m. Ashes from the great eruption in 1875 floated as far as Sweden.

Askrigg. Parish and vil. in the N. Riding of Yorkshire, England. It stands on Ure river, 11 m. W. of Leyburn by railway. Once famous for clocks, it is noted now for its grouse moors. Pop. 481. One m. S.W. is Bainbridge village where a horn is still blown every winter's night to guide travellers.

Askwith, GEORGE RANKEN ASKWITH, 1ST BARON (1861-1942). British administrator. Born Feb. 17, 1861, the son of a general, he was educated at Marlborough and Brasenose College, Oxford, becoming a barrister in 1886. In 1907 he entered the Board of Trade as assistant secretary, and in 1911 was made chief industrial commissioner, in which capacity he reported on the labour laws of Canada, 1912, and presided over the Fair Wages Advisory Commission, 1909-19. Knighted in 1911, he was raised to the peerage on retirement in 1919, but did not leave public life and in 1931 was chairman of the royal commission on Malta. Among his public appointments were the treasurership of the Y.M.C.A., presidency of the Institute of Arbitrators, and presidency of the National Greyhound Racing Society. He published *Industrial Problems and Disputes*, 1920, and a book on British taverns, 1928. He died June 2, 1942.

Askwith married in 1908 Mrs. Ellen Graham, who became a member of several government committees. She was the author of *The Tower of Siloam* and *Disinherited of the Earth*.

Asmara. Capital of Eritrea, N.E. Africa. It is 74 m. by rly. S.W. of Massawa, and stands 7,765 ft. above sea level. Strongly fortified and garrisoned by Italian and native troops, it contains several fine public buildings and the governor's residence. Occupied in 1889 by the Italians, it is a hub of rly. and road systems and busv agricultural and trading centre, with gold mines in the neighbourhood. Asmara superseded Massawa as the seat of government in 1900. Of strategic importance during the E. African campaign of 1941, Asmara was heavily bombed by the R.A.F. and was taken by Gen. Platt on April 1, many Italians being captured. Pop. 85,000.

Asmodeus. Evil genius of Hebrew tradition. The name is supposed to be derived from the Aeshma daeva, or demon of evil, of ancient Persian religion. In

the Book of Tobit the seven husbands of Sarah, daughter of Raguel, are said to have been successively killed by Asmodeus, hence he is sometimes regarded as the spirit opposed to matrimonial happiness. He is the principal character in Le Sage's romance *The Devil on Two Sticks*.

Asnières. Town of France, in the department of Seine. It stands on the river Seine, 3 m. N.W. of Paris, of which it is in effect a suburb. It has boat-building and other industries, and is a pleasure resort of Parisians, and a yachting centre. Pop. 71,831.

Asodake OR ASOSAN. Volcano of Japan, in Kiushiu. It is situated 27 m. E. of Kumamoto and consists of one active, Nakadake, and four quiescent peaks, the highest, Takadake, being 5,525 ft. above sea level. The outer crater, 17 m. N. to S., 10 m. E. to W., contains the five peaks and is the largest crater in the world.

Asoka (d. c. 228 B.C.). Buddhist emperor of India. He was the grandson of Chandragupta, the founder of the Maurya dynasty, and began his reign in 264 B.C. Asoka's dominions included all India from the 13th degree of latitude up to the Himalayas, Nepal, Kashmir, the Swat valley, Afghanistan as far as the Hindu Kush, Sind, and Baluchistan. After conquering the kingdom of Kalinga, about 261 B.C., he was so distressed at the horrors of war that he turned Buddhist, devoting himself to spreading the principles of Buddhism. His edicts are chiefly concerned with his code of practical morality and his methods of disseminating it. More than

thirty have been found inscribed in the local vernaculars on rocks, pillars, or in caves in different parts of his empire. One of the ten surviving pillars stands in the grounds of the fort at Allahabad. His life has been written by V. A. Smith, rev. ed. 1920; J. M. Macphail, 1918, and R. Mookerji, 1928. Consult also *The Outline of History*, H. G. Wells, 1928.

Asolo. Fortified town of Italy, in Treviso province. The ancient Acelum, it stands on a ridge 685 ft. high, 10 m. E.N.E. of Bassano, and has ruins of Roman baths, and a theatre. The 13th century castle was once the home of Caterina Cornaro, the last queen of Cyprus, who retired here following her abdication, and did much to alleviate the sufferings of the poor. Asolo was a favourite resort of Robert Browning; the house in which he lived is marked by a tablet and the street bears his name. In the parish church is a fine altarpiece by Lorenzo Lotto.

Asopus. Name of several rivers in ancient Greece. The most important were (1) in Sicily, flowing into the Corinthian Gulf; (2) in S. Boeotia, rising near Plataea. In mythology, Asopus was a river-god with twenty daughters, most of them associated with geographical names, especially of cities.

Asp. Term for various poisonous snakes. It is applied to the *Vipera aspis* of S. Europe and especially to the Egyptian snake now used by Egyptian jugglers, possibly the sacred serpent of ancient Egypt. Cleopatra's asp is believed to have been the N. African horned viper, *Cerastes cornutus*. Asp and the variant



Asmara. Victorious Indian troops marching through the capital of Eritrea after it was captured on April 1, 1941

Photo, British Official

aspic are used in poetry to denote any venomous snake. See Snake.

Asparagine OR AMINO-SUCCINAMIC ACID. Crystalline nitrogenous body originally found in asparagus (1805). It also occurs in the juices, growing buds, and germinating seeds of many other plants. By means of ferments asparagine, $C_4H_8N_2O_3$, is converted into ammonium succinate, by nitrous acid into malic acid, and by boiling with acids and alkalis aspartic acid and ammonia result.

Asparagus. Genus of plants of the family Liliaceae. The best known species is the common asparagus (*A. officinalis*), a native of the sandy S. and W. districts of Britain and of the sea-shores of Europe generally, first cultivated in Britain in the 16th century. The establishing of a bed of asparagus is a long process, since at least three years must elapse from the sowing of the seed until the time the plants are mature for cutting. But, once established, the bed will continue to yield a crop annually for 25 years or more. Cutting begins after three years, during the period from the middle of April to the end of June. After this, the plants are left to make their characteristic annual growth of fern-like foliage during July and August.

Asparagus Fern is the name given to various greenhouse perennials with light and feathery foliage, bearing orange and black



Aspasia, wife of Pericles

was greatly exaggerated by contemporary writers, Aristophanes accusing her of instigating the Samian and Peloponnesian wars. When Pericles was indirectly attacked by an accusation of impiety brought against Aspasia, he successfully defended her.

Aspasia. The wife of Cyrus the Younger. A native of Phocaea, her name was altered from Milto to Aspasia by Cyrus. On the death of Cyrus she became the mistress of Artaxerxes, who later gave her up to his son Darius. Later Artaxerxes took her back and made her priestess of Artemis at Ecbatana.

Aspdin, JOSEPH (1779-1855). British inventor. Working as a stonemason at Leeds, he invented cement; presumably by accident, as he was ignorant of chemistry and applied science. He found that by mixing finely pulverised lime with clay, burning it at a high temperature so that the carbonic gas was expelled, and pounding the resulting product to

married her. Although it was illegal for any Greek to marry with a foreigner, Pericles' son by Aspasia was legitimised by a special decree. Her influence with Pericles

Portland Cement Association, was unveiled in the town hall of Leeds, Sept. 6, 1924, the centenary of the invention. See Cement.

Aspen (*Populus tremula*). Tree of the family Salicaceae. A native of Europe, N. Asia, and N. Africa, it attains a height of from 50 ft. to 80 ft. It has a grey bark



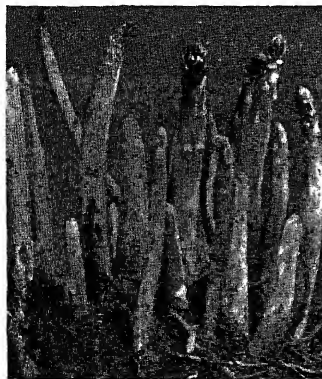
Aspen. Leaves of this tree, which are moved by the slightest of breezes

and spreading branches, and is a shallow-rooting tree with many suckers. The leaves are oval or roundish with irregularly toothed edges. The growth is rapid and the white wood inferior. The leaves are moved by the slightest breeze, and to this is due the popular image of the aspen leaf. See Poplar.

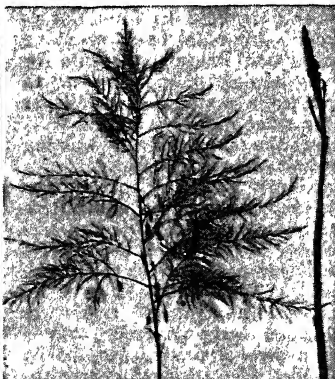
Asperges (Latin, Thou shalt sprinkle). Service preceding the principal Mass on Sundays in the Roman Catholic Church. The celebrant, having entered the sanctuary, sprinkles holy water from a portable vessel called the aspersorium, by means of a brush called aspergill or aspersol, on altar, clergy, and people. The service dates from the 10th century.

Aspern, BATTLE OF. Fought between the French under Napoleon and the Austrians under the archduke Charles, May 21-22, 1809. It is the French name for the encounter called by the Austrians the battle of Essling. The French had occupied Vienna, but the Austrian army was in being on the other side of the Danube. Napoleon sent his army across the river, using the island of Lobau as a centre for this operation, and soon 40,000 men were assembled on the Marchfeld, a plain between the villages of Aspern and Essling.

The French were unmolested while they crossed, but as soon as



Asparagus. On the left is a clump of the cultivated vegetable, showing how the edible shoots spring from the roots. On the right are two pieces of wild asparagus, showing the partly opened and fully developed upper growth



berries. *A. sprengeri* is a popular indoor plant, while *A. plumosus* is another variety. See Smilax.

Aspasia. The wife of Pericles. The daughter of Axiochus and a native of Miletus or Megara, she removed to Athens, where her wit and intelligence captivated Pericles, who divorced his wife and

powder, he evolved a material which was similar to Portland stone after water had been added and the mixture had set. Calling this substance Portland cement, Aspdin patented the process on Oct. 21, 1824, and set up a factory at Wakefield. A tablet to his memory, presented by the American



Asphalt. Damaged surface on the Victoria Embankment, London, being repaired by re-surfacing with hot powdered asphalt

they were over the last branch of the river, early on the 21st, the Austrians came on in five columns. Fighting ensued round the two villages, but neither side had secured any decided success when night came on. In the morning, fresh forces having arrived, the two villages were lost and regained, the Austrians in the end holding one and the French the other.

Napoleon then attacked and broke the Austrian centre, but the archduke prevented the advance from continuing, while the bridges behind the French were destroyed. In these circumstances Napoleon ordered the attack to cease and all the efforts of his troops were directed towards beating back the oncoming Austrians. The French at length got back to Lobau, and the battle ended in their defeat, the first ever suffered by Napoleon. The losses on both sides were heavy, amounting to about a third of the forces employed, which were 80,000 or 90,000 on either side.

Asphalt. Bituminous material associated with some inert mineral matter. Natural asphalt occurs in two main forms: (1) bitumen-impregnated limestone, known as rock asphalt; and (2) a fluid form composed of bitumen and silica (lake asphalt). Rock asphalt is found at Lovagny and Seyssel in France; at Neuchâtel in Switzerland; and at Ragusa (Dubrovnik) in Yugoslavia. Lake asphalt is found at the Pitch Lake (q.v.) in Trinidad, which yields annually upwards of 100,000 tons. At the middle of this lake the asphalt is liquid; nearer the shore it is semi-fluid in consis-

tency. Rock asphalt, after crushing and processing to free it from earthy materials, is used in one of two forms: powdered and heated, it is used directly as a paving material; it is also melted down and moulded into blocks of "mastic." For paving and road surfacing, the crushed and powdered asphalt is laid and rolled, after heating on the site, and then worked with heated irons to produce a smooth and impermeable surface. Mastic asphalt, after remelting in cauldrons at the place where it is to be laid or applied, is used to form damp-proof courses in brick or stone walls, for lining basements or areas against dampness; or to produce a waterproof top layer over a flat roof.

In the repairing of existing asphalt roadways the defective patch is "roasted" to melt the old layer, and new material is laid. Small portable roasters consist of a shallow bed of live coal supported over the patch and a few inches above it; larger (mechanical) appliances direct a body of flame over a large area of road, being fed by oil fuel. In another process the worn asphalt is dug out and new hot powdered material laid instead; the old material can be livened up with new and brought again into use. Lake asphalt is used with rock asphalt to produce mastic. A controlled amount of sharp grit is added, according to the solid content of the bituminous limestone, various grades being made for different purposes. Asphaltum is the name given to

a protective paint which is made from asphalt.

Under the influence of sunlight asphalt deteriorates; also, owing to its naturally dark colour, it absorbs solar radiation and becomes very warm, undergoing considerable expansion. This latter defect is overcome by using a top layer of crushed oyster shells or Derbyshire spar on a flat asphalt-covered roof or in a similar situation. Asphalt is attacked by oils and acids. During the Second Great War asphalt roofs proved very vulnerable to incendiary bombs, owing to the highly combustible nature of the bitumen content.

Artificial asphalts are made by mixing natural bitumen or some hydrocarbon of the same type with such materials as chalk, lime, sand, etc. Thus pitch or coal-tar can be used with crushed natural rock, the mixture being warmed until it is semi-fluid in form, and then laid and compacted. A hard-wearing top surface can be given to both the natural and the artificial product by incorporating suitable stone chippings, such as coloured marble. By incorporating certain pigments with the mastic a coloured asphalt surface is obtained, often used for tennis courts. See Bitumen; Road.

Asphalt. Lake in Trinidad. It yields large quantities of pitch or asphalt, and is better known as Pitch Lake (q.v.).

Asphodel (*Asphodelus*). Small genus of perennial herbs of the large family Liliaceae. Natives of the Mediterranean region, they



Asphodel. *Asphodelus ramosus*, one of the species of this Mediterranean genus

have fleshy roots in bunches and long slender leaves. The white or yellow flowers are clustered around the upper part of the tall stem, and are very showy. They are old-fashioned garden flowers, particularly the white asphodel (*A. albus*) of S. Europe and the yellow asphodel (*A. creticus*) of Crete. The ancient Greeks planted asphodel over graves, and Homer, in the *Odyssey*, speaks of an asphodel-meadow of vast extent in the under-world, the haunt of the dead. It was also used as an article of food by the poorer classes. The name daffodil is a corruption of asphodel. See Bog Asphodel.

Asphyxia (Gr. *a*, not; *sphysis*, pulsation). Condition produced by arrest of the respiratory functions ultimately terminating in death. Asphyxia may be due to natural causes, such as blocking of the pulmonary artery by a blood-clot, obstruction of the air passages by tumours, diphtheritic membrane, etc., or paralysis of the muscles of respiration by narcotic poisons such as opium.

Three stages are recognized in the condition. In the first the breathing is deeper, more laboured, and more rapid than normal, and muscles not usually concerned with respiration are called into play. In the second stage the efforts to obtain air become violent and convulsive, and are succeeded by general convulsions. In the third stage the sufferer becomes unconscious, all the muscles of the body are relaxed, and the pulse is scarcely perceptible. Feeble attempts at respiration occur at longer and longer intervals, and eventually death supervenes. The treatment of asphyxia is to remove the cause at once, if possible, and then start artificial respiration. See Drowning.

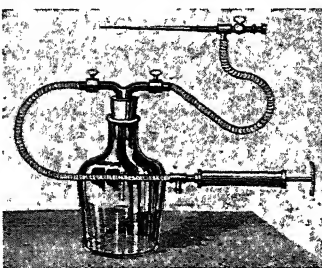
Aspic. Savoury jelly made from calves' feet, to enclose meat, fish, etc., flavoured with herbs, vinegar, and sherry. Aspic is also a poetical form of asp, and the jelly is perhaps so called from its being cold to the touch, like a snake.

Aspidistra. Foliage plant of the family Liliaceae, usually, but erroneously, called the parlour palm. A native of Japan and China, it was introduced into Britain in 1822. Ordinary garden soil with a mixture of leaf-mould suits it best, and it will flourish even in a smoky atmosphere.

Plunging the pot up to the brim in a pail of water of atmospheric temperature for about half an hour once a week, and sponging the leaves, is the best method of watering the plant in the absence of showers. When the aspidistra outgrows its pot, it should be separated by division of the roots in March. The presence of too much sand in the soil has a tendency to induce variegation in the colour of the leaves, and the practice of growing in very sandy soils is often indulged in for experimental and trade purposes.

Aspirate (Lat. *ad*, on; *spirare*, to breathe). Letter pronounced with a more or less emphatic emission of breath, or a sign used to indicate the same. Ancient Greek possessed two such signs, called rough and smooth, the former denoting an *h*-sound, but the distinction has now disappeared. French grammarians also speak of a mute and an aspirated *h*, but the latter is never pronounced. Its only effect is to prevent the elision of a vowel (*le Huguenot*) and to render the final consonant of a preceding word silent (compare the pronunciation of *les hommes* with that of *les Huguenots*). Although English recognizes no such difference, an idea of the existence and nature of the soft breathing may be obtained by contrasting the pronunciation of *an ice pudding*, where a sort of catch in the breath is heard, with that of *a nice pudding*. See Phonetics.

Aspirator. Appliance employed in filtering, and in several industrial and chemical processes. It is used to move fluids or gases by the production of a current of air. The simplest form of aspirator consists of a vessel with an outlet and an inlet tap. It is filled with water. When the tap is opened the water flows out, and air or other gaseous fluid is drawn through the upper tap from any other vessel with which it has been connected. The filter pump is another form of aspirator. It is



Aspirator. Surgical form, used for the removal of fluid matter from the body

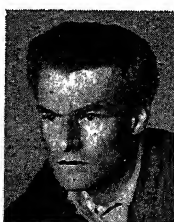
a tube through which water is passed under pressure, and a small opening in the side of the tube leads from a vessel from which it is desired to withdraw the air. As the water passes through, it draws the air with it, thus rarefying the air in the connected vessel and creating a partial vacuum.

Aspirin. Short name for acetyl-salicylic acid, ($C_9H_8O_4$), also sold under other names. The drug is used in rheumatism as an antipyretic, and to relieve neuralgia, headache, sciatica, etc. The dose is from 5 to 15 grs. In excessive doses aspirin tends to depress the heart's action.

Aspromonte. Forest-clad mountain of S. Italy. It rises behind Reggio di Calabria in the prov. of that name, and overlooks the Strait of Messina. The W. extremity of the ancient Sila range, it was the scene of the defeat and capture of Garibaldi by the Italian forces in 1862. Montalto, 6,423 ft., is the highest point.

Asproptomato. Modern name of the Greek river Achelous (*g.v.*). The name means white river.

Asquith, ANTHONY (b. 1902). English film director. Born Nov. 9, 1902, he was the youngest son



Anthony Asquith, English film director

of the 1st earl of Oxford and Asquith (*g.v.*). Entering film production, he directed *Shooting Stars*, *Underground*, *Tell England*, *Moscow Nights*, *Pygmalion*, *French With-out Tears*, *We Dive at Dawn*. **Asquith, SIR CYRIL** (b. 1890). British judge. The 4th son of the 1st earl of Oxford and Asquith (*g.v.*), he was educated at Winchester and Balliol College, Oxford, and was called to the bar in 1920. Between 1925 and 1938 he was assistant reader in common law to the council of legal education, becoming a member of the council in 1938. Recorder of Salisbury, 1937-38, he became high court judge attached to the general claims tribunal, 1939; chairman of the commission on higher education in the colonies, 1943-44; chairman of the royal commission on equal pay for equal work, 1944; and, in Feb. 1946, lord justice of Appeal and Privy Councillor. His publications include *Trade Union Law for Laymen*, 1927; *Life of Herbert Henry Asquith* (with J. A. Spender), 1932.

Asquith, HERBERT (1881-1947). English poet and novelist. The second son of the 1st earl of Oxford and Asquith (*q.v.*), he was born March 11, 1881, and was educated at Winchester and Balliol College, Oxford. He was called to the bar in 1907. His poems include *The Volunteer*; *Poems*, 1914-18; *Youth in the Skies*, 1940; his novels comprise *Wind's End*; *Young Orland*; *Mary Dillon*; and he wrote a memoir, *Moments of Memory*. He died Aug. 5, 1947. In 1910 he married Lady Cynthia Charteris, daughter of the 11th earl of Wemyss and March, and a short story writer.

Asquith, HERBERT HENRY. This distinguished statesman took the title of 1st earl of Oxford and Asquith. See Oxford and Asquith.

Asquith, MARGOT. The second wife of the above H. H. Asquith appears under Oxford and Asquith, Countess of.

Asquith, RAYMOND (1878-1916). British lawyer. Eldest son of the 1st earl of Oxford and Asquith, he was born Nov. 6, 1878, and educated at Winchester and Balliol College, Oxford. After an exceptionally brilliant scholastic career, he was called to the bar in 1904. A distinguished lawyer, he was Liberal candidate for Derby when the First Great War broke out. At once he obtained a commission, and in 1916 joined the Grenadier Guards in France. On

the absence of the chestnuts or callosities below the hock; and from zebras and quaggas in the suppression of the striping, which is reduced usually to shoulder and back stripes, though striped legs are not uncommon.

In the wild state the ass inhabits Asia and Africa and includes several sub-species. The kiang of Tibet is the largest and most horse-like, and stands about 13 hands high at the withers. The dziggeta of Mongolia and the onager of Persia, Syria, and W. India are smaller and more lightly built, seldom rising more than 11 hands. The African wild ass, of which there are several varieties, inhabits

Nubia, the Sudan, and Somaliland, and is of rather stouter build, good specimens rising 12 hands. It is from this species that the domestic breeds have been derived. The domestic ass, or donkey, as usually seen, owes its stunted size and its unkempt appearance to neglect and promiscuous breeding. Owing to its hardy constitution, docile disposition, working capacity, and cheapness, it is largely employed by those who cannot afford a horse.

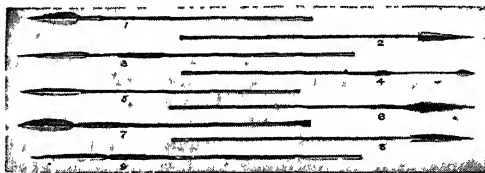
Proverbially regarded as stupid and stubborn, the ass is really remarkably intelligent, and, when kindly treated, the reverse of stubborn. Though early domesticated in Europe, it was not introduced into England until the days of Elizabeth. The largest of the domesticated asses is that of Poitou, which attains a height of from 14 to 16 hands, and is mainly used for mule breeding. A fine specimen is very valuable. The milk of the ass possesses qualities which render it suitable for invalids; its flesh is eaten in many parts, including France, and its skin is used in making drums.

Assab. Harbour of Eritrea. It stands on the W. coast of the Red Sea, at the entrance to Assab Bay, is a wireless station, and has a large export trade in hides, pearls,

and mother-of-pearl. Its industry is production of salines. Assab and the surrounding district were bought as a coaling station from the reigning sultan in 1870 by an Italian steamship company, and in 1882 became an Italian crown colony. The commissariat of Assab has an area of 5,500 sq. m. and a pop. of 3,926.

During the Second Great War Assab was announced as captured June 12, 1941, by troops from British ships and units of the Royal Indian Navy.

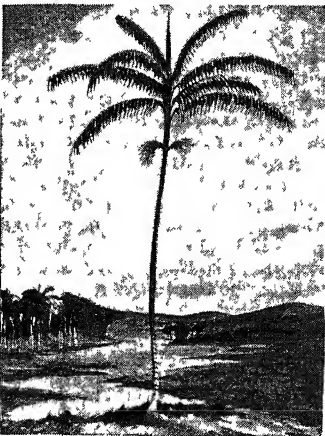
Assagai or **ASSEGAI**. Missile of the javelin kind employed by certain African tribes. The word is Berber, and came into English



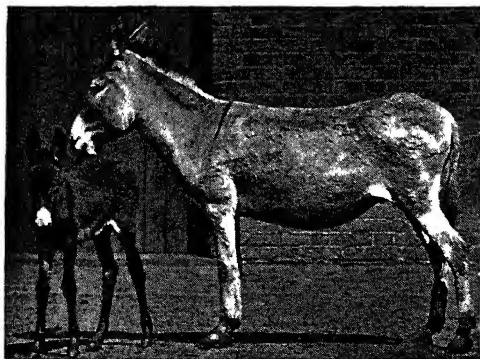
Assagai. Specimens from weapons of various tribes: 1. Nubian desert; 2. S. Africa; 3. Madagascar; 4. S. Africa; 5. Lake Banguela (S. Central Africa); 6. Somaliland; 7. Zulu; 8. S. Africa; 9. Zulu

through Arabic and Portuguese, the form assagai being the more correct. The name was originally given to a Berber weapon adopted by the Moors, a kind of slender spear or lance of hard wood, usually pointed with iron.

Assai Palm (*Euterpe edulis*). Native tree of Brazil. It is slender, graceful, from 40 ft. to 100 ft. in height, the bare cylindrical stem being surmounted by a head of long pinnate leaves with narrow leaflets. The centre of this leafy tuft, including the growing point and leaf-buds, is plucked out to



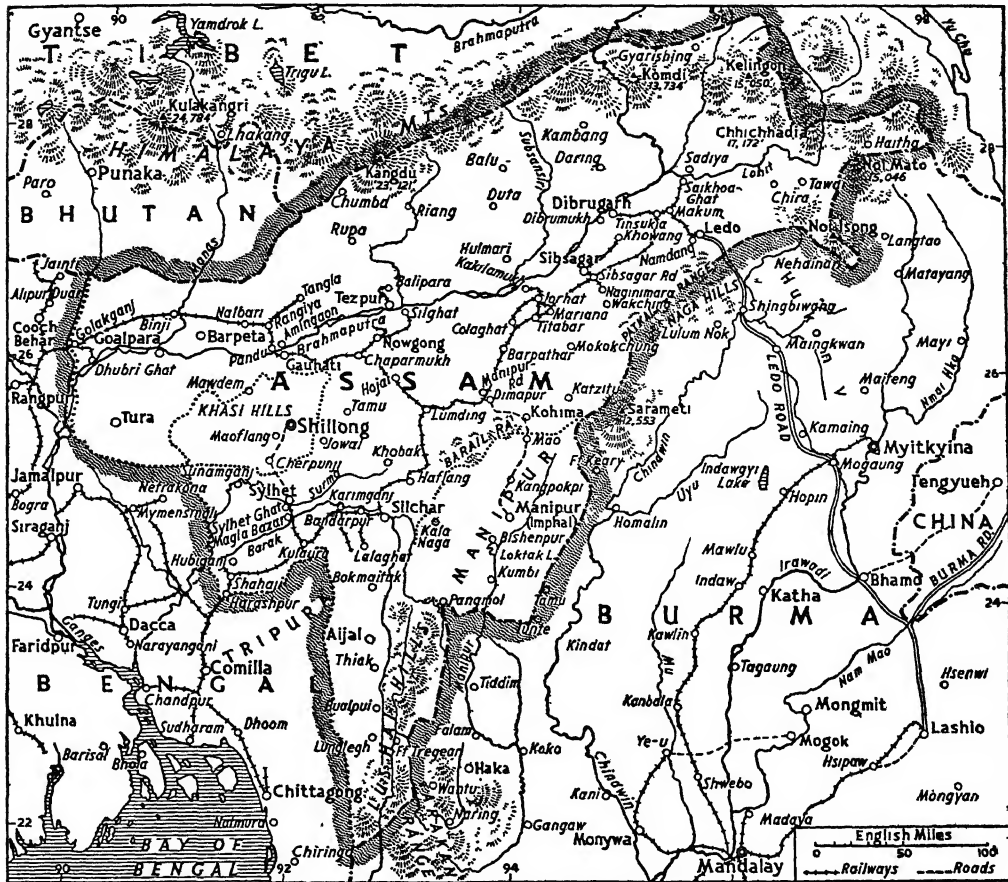
Assai Palm. *Euterpe edulis* of Brazil, both the growing point and the fruit of which are eaten



Ass. African wild ass and her foal. From this species the domestic breeds have been derived
Gambier Bolton, F.Z.S.

Sept. 15, 1916, he was killed near Ginchy while leading his men. His son Julian (b. 1916) became second earl of Oxford and Asquith.

Ass. Name applied generally to one of the four divisions of the genus *Equus*, the other three being the horse proper, the zebra, and the quagga. Asses differ from horses in the possession of an erect mane, a tufted tail, and long ears, and in



Assam, 1948. Map of the extreme N.E. province of India which lies beyond Bengal. It is a great centre of tea-growing. In 1947 almost all the Sylhet area was transferred to the E. Bengal province of Pakistan

be cooked as a vegetable or pickled, but this entails the sacrifice of the tree. It is more profitably allowed to flower and produce its sloe-like fruits, whose pulp, kneaded in water, forms a creamy fluid to which sugar and cassava farina are added. The resulting compound is a very nutritious food, which is the staple diet of large numbers of people, especially in and about the seaport of Para.

Assal. Salt lake of French Somaliland, E. Africa. It is in the volcanic basin of the Adel, 25 m. S.W. of Tajura, and is some 600 ft. below sea level—the lowest part of Africa. It is 10 m. long and 4 m. broad.

Assam. Prov. of the republic of India. In the extreme N.E. of the sub-continent, it is bounded N. by Bhutan and Tibet, W. and S.W. by Pakistan (E. Bengal), and E. and S.E. by Burma. It comprises many valleys, mainly of the Brahmaputra and its tributaries and the Surma, and the elevated

region which forms the watershed of these rivers. Its area, exclusive of Manipur and the Khasi states, is 55,043 sq. m. Mountainous in the N., where the eastern Himalayas form a natural boundary, the surface is generally hilly, especially S. of the Brahmaputra, the Khasi and Jaintia Hills districts covering an immense limestone area, the working of which has been carried on for a very long period. Coal and petroleum are extensively found, and gold and iron-ore are worked.

The soil is extremely fertile, although little more than one-third is under cultivation. Tea, its chief commercial product, was first cultivated in 1835, and the industry spread to such an extent that more than half the total area under tea in India now belongs to Assam. Rice is the staple product and mustard-seed is obtained; while in the forests several varieties of hard-wood trees flourish, besides lacquer and rubber-producing trees. The transport

facilities comprise an important system of railways in addition to the river service, by both of which communication is maintained with Calcutta. The rainy season lasts about half the year; Cherpunji, perhaps the wettest place on earth, averages over 400 ins. a year. Volcanic and seismic disturbances are not unknown, and the earthquakes of 1869, 1875, 1882, and 1897 caused much damage.

Tigers, leopards, bears, rhinoceroses, buffaloes, elephants, and other mammals infest the forests, and snakes also exist. Hinduism is the religion of nearly one-half of the natives; about one-fourth are Mahomedans, and one-sixth profess animism. Most of the towns consist of collections of small villages. The largest of them are Gauhati and Sibsagar; while the administrative headquarters are at Shillong. Pop. 10,204,733.

Assam is one of the least densely populated provinces of India. It was subject to incursions

by the hill tribes, and the Ahoms, who gave their name to the province, were engaged in ceaseless conflict with the Mahomedans of Bengal down to 1826, when, at the close of the first Burmese war, the southern territory was ceded to the British. Following gross misgovernment by the native ruler, the remaining portion of Assam was annexed and the whole province attached to Bengal. Constituted a separate province in 1874, Assam became part of the new province of Eastern Bengal and Assam in 1905, but in 1912 again became a separate province. On April 1, 1937, it was constituted an autonomous prov. In 1947 the dist. of Sylhet, formerly in Assam, was assigned to the Pakistan prov. of E. Bengal.

With the withdrawal of the British from Burma in May, 1942 the Japanese were at the frontier of Assam; but it was March 17, 1944, before they crossed it, in considerable strength, isolating both Imphal (Manipur) and Kohima. Kohima was relieved, and the Japanese cleared from it, by May 14; Imphal, fed, munitioned, and reinforced by air, held out until at the beginning of June troops broke out simultaneously from Kohima and Imphal, to meet and clear the road between them on June 22. By Aug. 25 the Japanese had been forced back over the frontier. See *Burma Campaign*; *Ledo Road*; *Sylhet*.

Bibliography. History of Upper Assam, L. W. Shakespear, 1914; History of Assam, E. Gait, 2nd ed., 1926; History of Assam, 1681-1826, S. K. Bhuyan, 1933.

Assam Highway. Road projected as an alternative supply route to China in the event of

Japan's capture of Rangoon and the consequent closing of the ocean terminus of the Burma Road. The route of the Assam Highway was surveyed in 1939, but the actual construction was not put in hand until 1940. The road runs from Chungking to Sadiya, the railhead of the Bengal-Assam railway, and gives the road-rail connexion with Calcutta (300 m.) and Chittagong (600 m.) on the Bay of Bengal. The total length of the Assam Highway is 2,200 miles, and its construction entailed even greater difficulties than those attending the building of the Burma Road. Between Chungking and Batang it crosses mountain ranges and broad, swift-flowing rivers. From Batang, over the Lower Himalayas, it passes through some of the most mountainous country in Asia. At one point it is 9,000 ft. above sea level, several thousand feet above the maximum height of the Burma Road.

Assassination. Term applied to the murder of a prominent personage. Most assassinations have been inspired by political motives, though occasionally, as in the cases of the duke of Buckingham and David Rizzio, private considerations have been a contributory cause.

Among instances in the Bible may be cited the slaying by Jael of the Canaanite leader Sisera, and of Eglon, king of Moab, by the judge Ehud; and in classical antiquity the murders of Hipparchus, tyrant of Athens, by the Athenian youths Harmodius and Aristogiton; of Philip of Macedon, of Julius Caesar, and of Elagabalus and other Roman emperors.

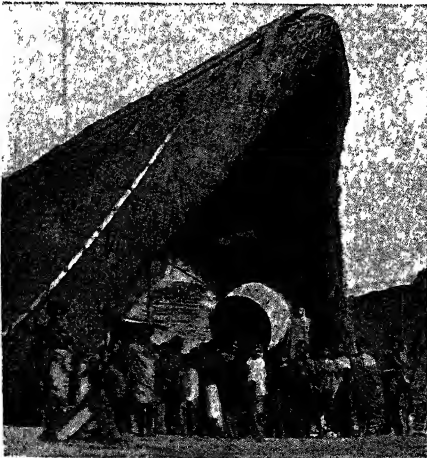
Among later victims were Albert I, German king, 1308; James I of Scotland, 1437; Cardinal Beaton, 1546; David Rizzio, favourite of Mary Queen of Scots, 1566; Lord Darnley, second husband of Mary Queen of Scots, 1567; the regent Murray, 1570; William the Silent, prince of Orange, 1584; Henry III of France, 1589; Henry IV of France, 1610; George Villiers, 1st duke of Buckingham, 1628; Wallenstein, the great imperialist general in the Thirty Years' War, 1634; Archbishop Sharp, 1679; Gustavus III of Sweden, 1792;

and the French Revolutionist J. P. Marat, 1793.

Notable victims in the 19th century were Paul I, emperor of Russia, 1801; the British prime minister Spencer Perceval, 1812; the German writer Kotzebue, 1819; Charles Ferdinand, duc de Berri, 1820; Abraham Lincoln, president of the U.S.A., 1865; Michael Obrenovitch III, prince of Serbia, 1868; the Spanish soldier and statesman Marshal Prim, 1870; the earl of Mayo, viceroy of India, 1872; Alexander II, emperor of Russia, 1881; James Garfield, president of the U.S.A., 1881; Lord Frederick Cavendish and Thomas Henry Burke, 1882; Marie François Sadi-Carnot, president of France, 1894; Elizabeth of Austria, 1898; Humbert, king of Italy, 1900.

William McKinley, president of the U.S.A., was assassinated in 1901; Alexander, king of Serbia, and his wife Draga, 1903; Carlos I, king of Portugal, and the crown prince, 1908; the Russian premier Stolypin, 1911; George I, king of the Hellenes, 1913; the archduke Francis Ferdinand and his wife, 1914; the French socialist Jean Léon Jaurès, 1914; Rasputin, favourite of the Russian empress, 1916; Nicholas II, emperor of Russia, and his family, 1918; Sir Henry Wilson, British general, 1922; Paul Doumer, president of France, 1932; the Japanese premier Inukai, 1932; Nadir Shah, ruler of Afghanistan, 1933; Engelbert Dollfuss, dictator of Austria, 1934; Alexander, king of Yugoslavia, 1934; Huey Long, dictator of Louisiana, 1935; Sir Michael O'Dwyer, British administrator, 1940; Trotsky, former Bolshevik leader, 1940; Heydrich, Nazi official in Czecho-Slovakia, 1942; the French admiral Darlan, 1942; Lord Moyne, British administrator, 1944; M. K. Gandhi, Indian leader, 1948; Count Bernadotte, U.N. mediator in Palestine, 1948.

Assassins. Name originally given by Europeans to the followers of the chief of a secret sect among the Mahomedans in Syria. It is a corruption of *Hashishin* (hashish eaters), since it was the custom to intoxicate the votaries of this sect with hashish before they discharged the tasks imposed upon them by their chief. Their law was unquestioning obedience to their head; their method mainly the organized murder of the victims selected by him. Their founder was Hassan Ibn Sabbah, who took the title of Sheikh-al-Jabal, the "old man of the



Assam. A chief's house in North Cachar. The large basket is used as a grain measure

mountains." He settled in Persia towards the end of the 11th century, but towards the middle of the 12th century the seat of authority was transferred to Syria. The sect or society whose initiated members had discarded the Mahomedan faith, while a rigid orthodoxy was generally imposed upon the uninitiated associates, played an obscure but active part in the politics of the East and in the intrigues of factions among Crusaders. They were finally suppressed in the 13th century by Hulaku, khan of the Western Mongols, who had made themselves masters of western Asia. So powerful was the society in its most flourishing days that it effected the murder of two caliphs.

Assault. In English law, a present threat of using force to the person of another, accompanied by a real or apparent intention and ability to carry the threat into effect. Words alone cannot be an assault. But the raising of a hand, with the apparent intention of striking a blow, is an assault, though the blow is never struck. If the blow is struck, however lightly, the offence is a battery which includes an assault. An assault is a crime punishable on summary conviction by a fine not exceeding £5 in amount, or by a sentence of not more than two months' imprisonment. On indictment, common assault may be punished up to one year's imprisonment. Aggravated assaults on females and young boys are more severely punishable. Assault with intent to rob is a felony and is severely dealt with.

Assaye. Village in Hyderabad, India. It is about 260 m. N.W. of the city of Hyderabad, and 43 m. N.E. of Aurangabad. It is notable for the battle between the British and the Mahrattas, Sept. 23, 1803.

In order to forestall the troublesome Mahratta chieftains, who were in league with France, two British armies were sent to Central India. General Wellesley, afterwards duke of Wellington, who commanded one army, found the enemy in a strong position near a river junction outside Assaye.

Although greatly outnumbered, he attacked at once. His men crossed the river and were led right up to the enemy's guns, which were in the charge of French officers and did much execution. The British got to close quarters, and using their bayonets put the foe to flight, but the fight was by no means over, for the Mahratta artillery got to work again, and their numerous cavalry was acting

vigorously when Wellesley saved the day by leading his horsemen against them. This charge was decisive, and the Mahrattas were routed. Their losses have been estimated at 12,000; those of the British were 1,650, a very high proportion of the men engaged.

Assaying (Fr. *essayer*, to try, test). Originally confined to the testing of ores and bullion, the term assaying now includes a large variety of industrial analyses. The accuracy required depends upon the particular industrial purposes for which the analysis is needed, the evaluation of precious metal ores and alloys requiring the highest degree of accuracy. Speed is usually of great importance, and advantage is taken of any new developments, both chemical and physical, which will shorten the manipulation without impairing the accuracy of the result.

The sample submitted to the analytical process must be truly representative of the consignment from which it is taken, and the importance of the sampling procedure cannot be over-emphasised. Considerable skill and experience are necessary and the method adopted will depend upon such considerations as the nature of the material, its monetary value, the processes to which it is to be subjected, and the labour and apparatus available. Consignments of ores and crushable materials may be sampled by taking one bag from, perhaps, every twenty, or by sampling one or more trucks from a train load. This would give the first "cut," the size of which would depend upon the total quantity to be sampled, the particle size, the value of the material, and the regularity of distribution of the mineral content. Fine material is more easily mixed, and is therefore easier to sample, but fine crushing is expensive and may be undesirable for economic or other reasons. Reduction of a consignment to a quantity suitable for analysis is effected by "hand sampling" or by "machine sampling." In the former case the pile of ore is "trenched" in two or more directions at right angles, the material removed forming the cut, or it may be built into a cone, flattened, divided into four quarters, and one, or more, of the quarters taken as the cut.

Another method is to shovel the ore from one point to another, one shovelful being taken at regular intervals to form the sample. The final assay sample is obtained

by repeating such treatments, crushing and grinding as necessary, until a suitably small sample is obtained. Sampling machines are of many designs, but work on one of two principles. The ore is caused to fall vertically and the sample is obtained either by deflecting a portion of the stream of ore continuously with a baffle or by removing a complete section of the stream at regular intervals with a rotating cutter. The process of crushing, mixing, and cutting is continued until a sample of suitable bulk is available for the assay office. The assayer obtains the actual sample for analysis by similar methods used on a smaller scale.

Metals are preferably sampled in the molten state, but this is not always possible. During solidification some segregation of the constituents usually takes place. This leads to sampling errors unless well-tried methods, peculiar to each metal or alloy, are employed. A suitable quantity of the metal is chipped, sawn, drilled, milled, or punched from specified points on the ingots that are to be sampled.

Dry or Fire Assay

The dry or fire assay simulates a smelting operation. The ground ore sample is mixed with such reagents and fluxes as are necessary and fused in a crucible. The reduced metal separates by gravity from the slag of fluxed gangue minerals which, after solidification, may be broken away with a hammer. In the assay of gold and silver ores, the weighed sample is mixed with lead oxide, charcoal, sodium carbonate, and borax, transferred to a crucible and heated to fusion in a furnace. The lead oxide is reduced by the charcoal to lead, which alloys with the gold and silver present in the ore and, when the melt is cast into a suitable mould, settles to the bottom where it solidifies to a "button," leaving a glassy, brittle slag on the surface. The lead alloy, cleaned from slag by hammering and brushing, is then cupelled, by fusing it at a yellow heat in an absorbent, shallow, cup-shaped vessel. This absorbs the lead, leaving the gold and silver in a globule or "pill," which is weighed and subsequently treated with "parting" acid, to dissolve away the silver. After annealing, the gold is weighed, the loss in weight indicating the amount of silver.

In the wet assay the metallic constituents of the sample are brought into solution, usually by

acid treatment. Chemical methods of separation are used to remove substances which would interfere with the reactions to be employed. Determination may be concluded by volumetric, colorimetric, gravimetric, or electrolytic methods.

In a volumetric assay the prepared solution is titrated with a standard solution of a chemical which reacts, preferentially, with the salts of the metal to be determined. Addition of this standard solution is continued to completion of the reaction, indicated by some convenient colour change which is due to a chemical "indicator." The percentage of iron in an ore, for example, may be determined as follows: the iron, brought into solution in sulphuric acid, is treated with a suitable reducing agent to form ferrous sulphate. Measured quantities of a standard solution of potassium permanganate are added to this solution which decolorises the permanganate so long as ferrous salts are present. In this instance the standard solution itself acts as the indicator: when all the iron has been oxidised, one further drop produces a pink coloration. The amount of iron in the ore is then calculated from the volume of the standard potassium permanganate solution added.

Testing by Colour

Colorimetric assays are based on the fact that some metals produce highly coloured solutions, the depth of colour being proportional to the quantity of the metal present. If ammonia, for example, is added to a solution of copper, an intense blue colour is developed. The assay sample having been dissolved, the copper is first separated from interfering elements with sulphuretted hydrogen. The precipitated sulphide is filtered, washed, and redissolved in acid. Ammonia is then added and the blue colour formed is matched with a series of standard solutions, similarly prepared, containing varying quantities of copper. The copper content is thus determined by comparison. The accuracy and speed of the method may be increased by physical means, e.g. photo-electric cells.

In the gravimetric assay the metal itself, or one of its compounds, is separated and weighed. Lead may be determined, after separation, by treating an acid solution with concentrated sulphuric acid and heating until all the lead is converted to sulphate. This is then filtered, washed, dried,

and weighed. The electrolytic assay depends upon the fact that the solutions of certain metallic compounds are electrolytes from which the metal may be deposited by the passage of an electric current. The electrode is weighed before and after the electrolysis, the gain in weight giving the quantity of metal deposited from the solution.

F. D. L. Noakes

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Asselyn or **ASSELIN**, JAN (1610–60). Dutch painter. Born at Diepen, near Amsterdam, he was trained under Esaias van der Velde and finished his studies in Italy. His pictures largely consist of views near Rome, in which cattle and figures are skilfully introduced. He died at Amsterdam.

Assembly (Lat. *ad*, to; *simul*, at one time). In general, a meeting of any kind. The term is used especially for an organized body of persons meeting together for some common purpose, and is thus different from an assemblage or promiscuous gathering. In a more particular sense the word is used to describe the second or upper house of certain legislative bodies; for instance, South Africa has a house of assembly. The word has a wide vogue in ecclesiastical matters, largely because it is used frequently in the Bible to translate two Hebrew words which denote the gathering together of the Israelites. Presbyterians especially adopted it about the time of Knox, as in the case of the Assembly of Divines or Westminster Assembly. Today the governing body of most of the Presbyterian churches is called the General Assembly. (See National Assembly.)

The phrase unlawful assembly has a legal significance. The best definition is by Sir J. Stephen: "An assembly of three or more persons (a) with intent to commit a crime by open force; or (b) with intent to carry out any common purpose, lawful or unlawful, in such a manner as to give firm and courageous persons in the neighbourhood of such assembly ground to apprehend a breach of the peace." In a case in 1882, where the Salvation Army persisted in holding meetings at a place where the rough element invariably broke them up with

violence, it was held that the Salvation Army meetings were not unlawful assemblies, because they had no unlawful or violent intent—the violent intent was on the side of their opponents. An unlawful assembly may be dispersed by force.

Assembly of Divines. Meeting convoked by the English Parliament in 1643, but forbidden by Charles I, to consider the liturgy, government, and doctrines of the Church. It is also called the Westminster Assembly (*q.v.*).

Assen. Town of Holland, capital of Drenthe province. It is 16 m. by rly. S. of Groningen, and is connected with the Zuider Zee by canal. An educational and civic centre, it has a museum containing some of the prehistoric remains found in the tumuli of the neighbourhood. Pop. 20,235.

Assent, ROYAL. Final stage in the passage of a bill through the British Parliament. The ceremony takes place in the House of Lords, and the assent is given at one time to a group of bills which have been duly passed by parliament. The king is represented by three commissioners, who sit in front of the throne, while the Speaker and members of the House of Commons stand at the bar. A clerk reads out the king's commission empowering the three peers to act for him, and the clerk of the crown reads out the title of each bill. The clerk of the parliament replies in Norman French, *Le roy le veult* (the king wishes it), and the bill is law. See Act of Parliament.

Asser (d. c. 909). An English historian and bishop. A monk of St. Davids, he was invited to court by King Alfred about 885, where he assisted the king in his studies. Some time before 900 he was appointed bishop of Sherborne. He was the author of a Life of Alfred, *De rebus gestis Aelfredi Magni*, an edition of which was issued by Archbishop Matthew Parker in 1572 and by Francis Wise, 1722. The best edition is that of W. H. Stevenson, 1904.

Assessment (Lat. *ad*, to; *sedere*, to sit). Term used in England, in connexion with the levying of rates and taxes, for the amount of money on which a person pays. He is assessed for income-tax for a certain amount, and his house and lands are assessed for local rates for a certain amount. In this way, the assessment being known, the amount to be paid is easily calculated at so much in the £, 8s. 6d. or 15s. 8d., or whatever it may be.

Great Britain is divided into assessment areas each with an assessment committee which approves the valuation list prepared by the rating authority. The term is also used for the damages fixed by a jury in a law court.

It is connected with assize. In early times an assize or sitting of men from the neighbourhood was held to settle questions of taxation—or, in modern parlance, to assess the taxpayers. See Rating.

Assessor. Name given to one called in by a court to assist in technical matters. The assessor is not a judge. Thus, in Admiralty cases the Elder Brethren of Trinity House may be, and often are, called in as assessors to advise the judges on matters of navigation and the like. In workmen's compensation cases the county court judge can call in a medical man to advise him on medical or surgical matters. Under the Clergy Discipline Act, 1892, lay assessors sit with the bishop's chancellor as a sort of jury to determine questions of fact.

Assets (Latin *ad*, to; *satis*, enough). Commercial term most frequently employed when an account of debits and credits is made. Such occasions are when the estate of a bankrupt is being investigated, or a company is in liquidation, or the property of a dead person is being distributed. In general, however, all the properties and possessions of a corporation, company, or individual are assets.

Asshur or **ASSUR**. Greatest of the ancient gods of Assyria. He was regarded as self-created and the father and king of the other gods. There was a great temple to him in Nineveh. See Assyria.

Asshur or **ASSUR**. The earliest Assyrian capital. It stood at Kalat Sherghat, on the right bank of the Tigris, 55 m. S.E. of Mosul, now in Iraq. Spelt more correctly Ashshur, it gave its name to Assyria. A prehistoric settlement, it was occupied by Semitic Babylonian migrants before Hammurabi, was deserted for Calah by Shalmaneser I, and was rebuilt by Tiglath-pileser I. Andrae's excavations, from 1904 onwards, revealed its Asshur temple, royal palaces, and tombs, and house foundations. See Patesi.

Assign (Lat. *ad*, to; *signum*, sign). English legal term for the passing of personal property by deed or other appropriate document. Thus, in a deed of gift of (say) furniture, the furniture is assigned by the donor. Leaseholds are assigned, but in conveyances

of freeholds the word assign is not used, because freeholds are real, not personal, property. The word is also applied legally to the person to whom property is transferred.

Assignat (Lat. *assignatus*, assigned). Name given to a species of paper money issued in France during the Revolution. The condition of the country's finances led to this expedient, and in 1790 the Constituent Assembly, on the motion of Mirabeau, issued notes to the value of 400,000,000 francs. The security behind them was the land forfeited to the state, which was assigned to the holders of the assignats, hence the name. The nation's creditors were paid by assignats and with them they could buy blocks of the public land. On the notes interest at the rate of five p.c. was promised.

So far the scheme was not altogether unsound, but in 1790 more public debts were discharged by a larger issue of assignats. They were made legal tender, and soon the country was flooded with them. Some were redeemed, but far more were issued and on them no interest whatever was paid. Consequently they began to fall rapidly in value, and the authorities in vain attempted to stop this by threatening those who refused to accept them with heavy penalties. By 1796 the assignats had become almost valueless, a state of affairs made worse by the circulation of forgeries. At one-thirtieth of their value they were exchanged for *mandats*, and later the unfortunate holders of these obtained about one-seventieth of their face value in coin.

Assignment. In Scots law, the transfer of rights or movable property to another, the equivalent of the English assignment. Such a transfer must be notified to the debtors concerned to make it valid.

Assignment. One of the most general words used to indicate the legal transfer of property from one person to another. Every species of property has its own legal mode of assignment or transfer. Thus personal chattels are assignable by delivery or by a writing called a bill of sale. Freeholds are assigned by deed of grant; leaseholds by deed of assignment; *choses in action*, except negotiable instruments, by writing under the hand of the assignor, and notice thereof to the debtor whose debt has been transferred. In equity many methods of assignment have been enforced which the common law would not have recognized. Thus, if A requested B, his debtor, to

pay the debt to C, it was an assignment of the debt to C, in equity.

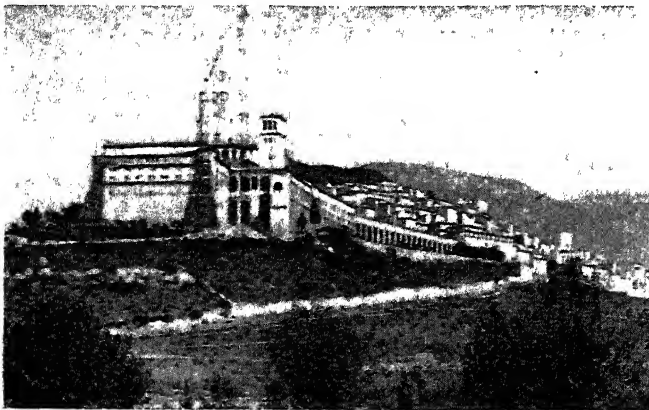
Assimilation (Lat. *ad*, to; *similis*, like). Philological change, chiefly of consonants, to facilitate utterance. It is complete, when two consonants of different quality become the same (apposition, Lat. *appono*, originally *adpono*); incomplete, when they are only made more like in pronunciation (ankle, where *n* is sounded as if *g* followed, to facilitate change to *k*).

In physiology, the processes by which the living body of an organism builds up relatively simple materials into the complex substances of which it is itself constituted. In animals and non-green plants assimilation is usually preceded by the digestion of organic food into the simpler material required for the building-up process. In green plants such materials are synthesised (see Photosynthesis) from inorganic matter.

Assiniboins (Ojibwa, stone-roasters). Tribe of North American Indians of the Siouan linguistic family. Separated in late pre-Columbian times from their ancestral stock near the head-waters of the Mississippi, they migrated northward, giving their name to a stream that enters the Red river at Winnipeg and to Assiniboia, former dist. of N.W. Canada.

Assisi. Town and episc. see of Italy, in the prov. of Perugia. It is 15 m. by rly. E. by S. of the town of Perugia, and stands on a hill 1,345 ft. high. The ancient Assisium, it is dominated by a castle, and is famous as the birth-place of S. Francis (1182–1226), who established the order of Franciscans here in 1208. The monastery, founded 1228, has two churches, built one above the other and completed in 1253. They are adorned by many frescoes and pictures, the work of Cimabue, Giotto, and others, and have a crypt built in the 19th century, in which the bones of the saint were placed. Other ecclesiastical buildings are the cathedral, erected in 1140 and restored in 1572, and the churches of S. Maria, converted from a temple of Minerva, and S. Chiara, in which are buried the remains of S. Clara. S.W. of the town is the massive church of S. Maria degli Angeli, built over the oratory of S. Francis and containing the cell in which he died. At Assisi were born the poets Propertius (c. 50 B.C.) and Metastasio (1698–1782).

The town was captured from the German occupying force by the Allied 8th army on June 18, 1944. Assisi was undamaged as a result



Assisi. Historic town of central Italy. The prominent towered building is the Franciscan monastery which was founded in 1223

of the hurried retreat of the Germans, and the pictures, stained glass, etc., stored in the vaults below the Sacro Convento and the cathedral were safe. Pop. 20,000.

Assiut, *Asyūt*, or *SUT*. Prov. of Upper Egypt. It has an area of 812sq. m., and includes the districts of Abnub, Abu-Tig, Assiut, Bedari, Dakhla, Deirut, Kharga, Manfalut, and Mellawi. Pop. 1,205,321.

Assiut, *Asyūt*, or *SUT*. Town of Upper Egypt. It is situated near the Nile, 248 m. S. of Cairo. The Greek Lycopolis, Assiut has been, and still is, a centre for caravan trade with Darfur and the interior. Below El Hamra, port of Assiut, is the barrage across the Nile, completed in 1902 at a cost of £1,000,000, controlling the water supply of the Ibrahimiya Canal, which irrigates the surrounding land to within a few miles of Cairo. In 1934-38 the barrage was remodelled to increase by 3 ft. 4 ins. the head of water impounded. In the hills which rise behind the town are extensive rock tombs. Pop. 60,338. *See* Assuan.

Assize (Lat. *assidere*, to sit beside). In early England, a word with several meanings. It denoted an assembly, the decisions or laws of such an assembly, a method of judicial procedure, and a jury. The first sense passed into the second, hence the assize or laws of Clarendon and the assize or law of arms. Prices were fixed by an assize and so we have the assize of bread, ale, etc. Certain kinds of actions at law were known by the same word, e.g. the assize of *mort d'ancestor* and the assize of *darein presentment*. The assize meaning a legal action was not finally abolished in England until 1835, and in Scotland the criminal jury is still called the jury of assize.

Assize of Arms. Law of England, passed in 1181, towards the end of the reign of Henry II. By it every freeman was ordered to provide himself with armour suited to his rank and wealth. The feudal army composed of the barons and their retainers not having given satisfaction, the king fell back upon the older principle of universal service to provide a national force. By the assize a knight, or one who had an income of sixteen marks a year, had to provide a coat of mail, helmet, shield, and lance; a freeholder with ten marks a hauberk, iron cap, and lance; and all burgesses and other freemen a gambeson or leather coat, iron cap, and lance. The local justices had to see that the provisions of the law were enforced.

Assizes. Word, the plural of assize, used in England for the periodical visits of the judges to various provincial towns, where they try the more important civil and criminal cases. The whole of England and Wales, outside the metropolitan area, is divided into circuits which are visited by the judges twice, or sometimes three or four times, a year. The towns at which they sit are called assize towns. The official who records the doings of the judges is called the clerk of assize, one being appointed for each circuit. Circuits may be discontinued either temporarily or permanently by Order in Council. *See* Circuit.

Associate (Lat. *ad*, to; *socius*, companion). Name given to certain clerks of the Crown Office, and certain officials of circuits. They need not be barristers or solicitors, and their business is to help the court by drawing up a list of causes, drawing the jury

ballot, entering the verdict, making a note of the judgement, and the like. The associate always sits robed, under the judge, and facing the court. The word is also used for a member of a society whose status is not that of a full member, e.g. the Royal Academy has associate members (A.R.A.).

Associated Press. Non-profit-making, cooperative association serving the world news and photographic needs of more than 2,500 newspapers and radio stations. It operates 285,000 m. of news wires in the U.S.A., a 20,000-m. wire-photo network, and has extensive global facilities with offices and representatives in more than 150 world capitals on six continents. It employs thousands of full-time staff members and several thousand special correspondents. It produces a news report of 1,000,000 words every 24 hours. Head offices are at 50, Rockefeller Plaza, New York; the London office is at 85, Fleet Street, E.C.4.

The first Associated Press in the U.S.A. was started by J. Gordon Bennett and others in New York in 1848. There followed in 1865 the Chicago or Western Associated Press, and in 1867 the United Press. In 1889 the United Press became the Laffan News Syndicate, and the Chicago association dropped out in 1900. The existing United Press Association was founded by the Publishers' Press and two other news agencies. Other American agencies are the Hearst and International News Service, and the National Negro Press Association. *See* Newspaper; Press Association.

Association. Term for any society or combination existing for a common purpose. Thus there are business associations, of both masters and men, religious, philanthropic, political, cultural, and sporting associations.

In English history the word is used in a special sense for associations formed to protect the life of a sovereign in times of marked danger. In 1584, after the Roman Catholics had laid several plots against the life of Elizabeth, a voluntary association was formed, the members of which pledged themselves to "withstand and revenge" all attempts on her life. This association was at once legalized by Parliament. In 1696, after the failure of a plot to murder William III, a somewhat similar association was formed by Parliament. The word was also applied to a union formed by the eastern counties early in the Civil War, its

object being to keep the war outside their own borders. Cromwell was a leading spirit in this.

Association Cup. A trophy competed for annually by football clubs in England playing the Association game. It was arranged in 1871. Fifteen clubs, all amateur, entered, and the first final was played at Kennington Oval, March 16, 1872, between the Wanderers and the Royal Engineers, the former winning by one



Association Cup
English football
trophy

goal to nil. In 1884 Blackburn Rovers first won the cup, and soon afterwards amateur teams began to fall out of the competition. The cup has been won on six occasions each by the Wanderers, Blackburn Rovers, and Aston Villa. In 1889, and again in 1905-6, the method of competing was rearranged. As the competitors had become more in number than the original fifteen.

Nowadays preliminary and qualifying rounds are played all over the country between clubs in regional groups. On a Sat. in Nov., 27 survivors from this competition join 41 clubs from the third division of the football league in the first round proper of the Cup. Two rounds reduce these 68 to 17, and for the third round, in Jan., they are joined by the 44 clubs of the first two divisions and the three from the third division which have been exempted till then. After the sixth round come semi-finals.

With the exception of one game at Lillie Bridge, in 1873, and a replay at Derby in 1886, the final tie was decided at Kennington Oval from 1872 to 1892, but in the latter year it was found that the crowd had become too large for that enclosure and the final games in 1893 and 1894 were played at Manchester and Everton respectively. These grounds also proved too small, so in 1895 the game was transferred to the Crystal Palace ground, and here the final ties continued to be played down to 1914, when the competition was suspended as a result of the First Great War. From 1920 until 1922 the final tie was played on the Chelsea Football Club's ground at Stamford Bridge.

Since 1923 it has been played in the Wembley Stadium, usually in the presence of the King. *Consult* Official History of the F.A. Cup G. Green, 1949.

Association Football. For this game (popularly, Soccer), *see* Football.

Association of Ideas. In psychology, the theory that ideas are naturally so closely united that when the mind evokes one of them it recalls all others that have been associated with it. The process is involuntary, and governed by certain laws: (1) the law of succession and simultaneity: thus, places bring to mind events that have occurred there, and meeting one of two persons whose acquaintance has been made simultaneously recalls the other; (2) the law of similarity and contrast: thus, Gladstone and Beaconsfield, Homer and Virgil, Dickens and Thackeray, virtue and vice, heaven and hell, correlatives such as cause and effect, whole and part. -

According to the empirical school of the English philosophers of the 18th century, association is the combination and reproduction of ideas in a passive condition of consciousness. To this it is objected that reproduction in the strict sense of the word, that is, unchanged reproduction, does not take place, and that the ideas assumed to be unities are not unities at all, but the result of combinations. Modern psychologists define association as the passive combination of the elements of the content of consciousness. These, according to Wundt, are: fusions, the blending together of a number of sensation qualities, the result of which is the perception of the nature or character of some material object; assimilations, which, under the influence of the elements of other images, produce alterations of given mental images; complications, by which dissimilar psychical images are combined; successive associations, which in connexion with the simultaneous fusions, assimilations, and complications, produce combinations of successive mental images. *See* Metaphysics; Philosophy; Psychology.

Assolzie (Latin *absolvere*, to acquit). In Scots law, word used to describe the acquittal of a defendant or a prisoner.

Assonance (Lat. *ad*, to; *sonare*, to sound). Repetition of vowel sounds without regard to the consonants as a substitute for rhyme. Instances are dwell and tread, sleep and feel, gloaming and boating. Naturally, it is most common

in languages where the vowel sounds predominate over the consonants—Romance languages as distinct from Teutonic—but it is hardly satisfactory to the fastidious ear, and generally has been discarded in favour of rhyme as literature has developed. It is, however, a distinguishing characteristic of the lyrical and dramatic literature of Spain and Portugal. In France, assonance is found in the romances of the *trouvères*, but was rejected early in the history of French poetry, and some modern attempts to reintroduce it met with small encouragement. In Scottish poetry it is common, but it was long ruled out of English as not permissible, although Elizabeth Browning employed it, and modern writers have brought it back experimentally.

Assonance is found in its most elaborate form in Celtic poetry, where perfect rhyme is almost unknown. Here the original terminal assonance has been developed and a system invented by which the last word of one line corresponds with the middle word of the next, and words in the same line also chime, or are in assonance, with one another.

Assos. Ruined city of Asia Minor. It stands at the entrance to the Gulf of Adramyti, opposite Mitylene, and near it is the modern village of Bahram. It was built upon a high cone of trachyte, and supposedly founded by colonists from Methymna. Excavations undertaken in 1881-83 by the American Institute of Archaeology brought to light the fragments of bas-reliefs of the Doric temple of Athene, and enabled a plan of the temple to be outlined. A number of sculptured panels of the temple are deposited in the Louvre, Paris.

Assuan or **Aswân.** Province in Upper Egypt. It contains the districts of Assuan, Derr, and Edfu, and has an area of 363 sq. m. Pop. 305,096.

Assuan or **Aswân.** Town in Egypt, on the right bank of the Nile, near the first cataract. The ancient Syênê, it was of much importance under the Pharaohs, but its period of greatest prosperity was during the Roman domination. Near are the granite quarries whence materials for many of the Egyptian monuments and temples were obtained. The whole neighbourhood is rich in archaeological remains, especially some of the islands of the Nile, such as Elephantine and Philae.

Three m. S. is the dam across the Nile, opened Dec. 10, 1902. This



Assuan, Egypt. Air view of the great dam across the Nile, a mile and a quarter in length, planned and carried out by British engineers. It was opened in 1902, was made higher in 1912, and again in 1931-34

was designed for irrigation purposes and flood control, in conjunction with the barrage at Assiut (*q.v.*) and other similar works on the Nile. In 1912 the Assuan dam was made higher, and during 1931-34 its height was again increased, this last operation adding 30 ft. and doubling the storage capacity of the reservoir. Nearly 240 reinforced concrete buttresses were built to give the added strength to hold back the extra weight of water. Pop. 22,192.

Assumpsit (Lat., he has undertaken). In English law, an obsolete form of action at common law for damages for breach of any contract other than a contract under seal which a defendant "has undertaken" to carry out.

Assumption (Latin *ad, to; sumere, to take*). Term used for the taking up into bliss of the souls of departed saints, but more distinctively applied to the festival of the Assumption of the Virgin Mary, Aug. 15.

The festival was originally kept in January, in both the East and West, as early as the 5th century, and now in the former as the Falling Asleep, and in the latter as the Assumption of the Virgin Mary, is still the principal festival in her honour, and a day of obligation for Roman Catholics. It has no place in the prayer-book of the Church of England, and belief in the corporal assumption is not an article of faith in the Roman Catholic Church. The word must be distinguished from ascension. The latter implies a going up, while assumption is a taking up.

The Assumption is the theme of many famous pictures, *e.g.* by Perugino, in the Academy at Florence; Guido Reni, in the Munich Gallery; Fra Bartolommeo, in the Naples Museum and at Besançon ;

Antonio Allegri (Correggio), in the Duomo at Parma; Titian, in the Accademia delle Belle Arti, Venice, regarded as this artist's masterpiece; and Peter Paul Rubens, in the Brussels Museum.

Assumptionists. Name given to several Roman Catholic religious communities. That of the Little Sisters of the Assumption, or Nursing Sisters of the Poor, was founded at Paris in 1864. The Oblates of the Assumption are a community of women founded about 1866, with establishments in England, France, Belgium, Turkey, Bulgaria, and Asia who devote themselves to teaching children and visiting the poor. A branch of the Augustinian Order founded in 1845 is known as the Fathers of the Assumption.

Assurance

(Lat. *ad, to; securus, safe*). Act of making sure. The word is used for the insurance of life, the offices which do this being known as life assurance companies. Today the word insurance (*q.v.*) is more popular.

Assynt. Fresh-water loch or lake

of Sutherlandshire, Scotland. It is 6 m. E. of Lochinver, lies 215 ft. above sea level is $6\frac{1}{2}$ m. long by about $\frac{1}{2}$ m. wide, and contains sea and loch trout. On its shores the marquess of Montrose, escaping from defeat at Corbisdale, was captured by Neil Macleod, May 4, 1650.



Assumption of the Virgin. By Andrea del Sarto Pitti Gallery, Florence

ASSYRIA: THE MESOPOTAMIAN EMPIRE

Rev. T. Witton Davies, Professor of Semitic Languages

This article, like that on Babylonia, deals with one of the world's ancient empires. Related information will be found under the headings Mesopotamia; Tigris; Euphrates; and in articles on the various deities and cities of Assyria

Few ancient people have left behind them such copious material for reconstructing their history as the Assyrians and Babylonians. Their rulers felt the need as no others have done of recording their own achievements, engaging for this purpose a special class of men who engraved on stone in the cuneiform script the principal events of their reigns. They must also, in addition to these artists in stone, have had a literary guild whose business it was to prepare the substance and language of what the engravers had to commit to stone.

But Assyrians and Babylonians reflect their respective interests and character by the things which they loved to record. The Babylonian and Chaldaean inscriptions chronicle for the most part deeds of peace, the building of temples and palaces, the digging of canals, etc. They were, above all, a literary and religious people. Assyrian inscriptions, on the other hand, tell almost exclusively of wars, victories, triumphant processions, hunting expeditions and the like. The Assyrians were, above everything else, a military people.

THE LAND. The Assyrian homeland was an upland region, bounded on the N. by the Armenian highlands, on the E. by the Zagros ranges, on the W. by the middle Tigris. In these latitudes the Mesopotamian tableland, poised high above the alluvial plain of Babylonia to the S., is an arid, treeless, undulating country, adverse in all ages to settled life. With the exception of Asshur itself, which occupied a strategic spur guarding the right Tigris bank, no part of Assyria itself lay "between the rivers."

RACE AND LANGUAGE. The word Assyria comes from the Greek form of the original name *Ashshur*, usually transliterated as *Asshur*. This word stood first of all for the god, then for the city dedicated to that god; subsequently, as the city grew, the same name came to be used for the larger territory, standing in the course of time for the kingdom and finally for the empire.

The earliest accessible information shows that the Assyrians wrote and spoke in Semitic, their language differing only dialectically from the Babylonian. They had, however, Sumerian names for their gods and temples. All this points

to the high probability that the earliest Assyrians came from Babylonia. Some verses in Gen. 10, properly construed as in the R.V., support the evidence of language that the first settlers in Assyria were Babylonians.

Though of Babylonian origin, the Assyrians were more purely Semitic, because they were less exposed to invasions and lived in greater isolation. For their religion and culture they were dependent upon the Babylonians, as the Romans were upon the Greeks. Their climate was colder, being temperate, not, as in Babylonia, sub-tropical. They became, therefore, a hardier, more courageous people than the nation from which they sprang. They were pre-eminently a military and commercial people, ruthless in war, practical and selfish in business.

At its beginning Assyria embraced no more than the city Asshur, which was situated on the W. of the Tigris, near its confluence with the Lower Zab. It was not one-tenth the size of ancient Babylon. Its rulers were called Ishshakku, corresponding to the Babylonian Patesi. Such rulers combined the priesthood with the headship of the state.

HISTORY. The history of Assyria may be divided as follows: (1) Early Period down to about 1400 B.C., when the nation became independent of Babylon; (2) Middle Period, that of general though not uniform growth, from 1400-745 B.C.; (3) Final Period, climax and collapse, 745-607 B.C.

(1) *Early Period.* Assyria is mentioned as a dependence of Babylonia in an inscription left by Gudea, Patesi of Lagash (c. 2500 B.C.). The princes (*ishshakku*) of Asshur are mentioned in an inscription by Hammurabi, the great king of Babylon (c. 2100 B.C.). Among the earliest rulers of Assyria may be mentioned Shamshiadad I (c. 2100 B.C.), who fixed the prices of certain important articles of commerce, just as his Babylonian contemporary, Hammurabi, determined the rate of wages as well as the price of certain commodities. Ilushuma (c. 2000 B.C.) was the first Assyrian ruler to challenge in the field the military power of Babylonia, though without success. These early Assyrians erected private houses, mansions, palaces, and temples. They dwelt in walled cities. Their religion was polytheistic. They had learnt to write, the script being cuneiform, the language Semitic—closely akin to the Hebrew. They had acquired a knowledge of the arts of war and government, and of the principle of taxation as applied to the homeland and conquered peoples. We know from the Tel-el-Amarna tablets that about 1450 B.C. the Babylonians still claimed supremacy over Assyria.

(2) *Middle Period.* About 1400 B.C. Assyria became relatively so strong that Burnaburiash I, king of Babylon, was glad to make a treaty on equal terms with Buzur-Ashir I, king of Assyria. The decline of Babylonian power during the reign of the Kassite kings gave Assyria its opportunity of asserting its independence (c. 1400 B.C.), and even its superiority over Babylon. Ashurbanit II (1418-1370 B.C.) was the first Assyrian king to become ruler also of Babylonia, though he was soon expelled, Babylonia becoming independent once



Assyria. Map showing the position of the ancient empire, with its capital, Nineveh, midway between the Mediterranean and Caspian seas

more. The success of Assyria in Babylon whetted her appetite for further conquests. She had her mind upon the land about the Upper Euphrates, and also upon the land westward towards the Mediterranean, her object being to a large extent to command the trade route from Egypt and Syria to the N., but she had powerful enemies to contend with—the Hittites, the Arameans, the Mitanni, and the Armenians.

Conquests of Tiglath-pileser I

The history of Assyria from about 1300 B.C. to its fall in 607 B.C. may be not inaptly described as one continuous battle, sometimes for existence, very often for extension of territory and increase of wealth, but most of all for the suppression of rebellions in cities, provinces, or countries which she had once conquered, for the kings of Assyria never mastered the art of attaching subject peoples to themselves or to their government.

From 1240 to 1120 B.C. the Assyrian records are almost silent, for there were no great achievements to boast. With the advent to the throne of Tiglath-pileser I (c. 1120 B.C.) a new and greater era began. Before the end of his reign he had won back for his country the whole of Babylonia and made Assyria the greatest empire of the time. He was a great hunter, and boasts of having killed 120 lions on foot and 800 in his hunting chariot. He made Asshur once more the Assyrian capital, greatly enlarging and improving it, planting in its vicinity a botanical garden and also zoological gardens.

Under Ashurnatsirpal III (884-860 B.C.) a still more prosperous time for Assyria set in. He was a military genius, though ruthlessly cruel, as were most of the Assyrian kings. In one of his inscriptions, which has come down to us, he thus describes the punishment of a rebellious city—"with battle and slaughter I assaulted and took the city, 3,000 warriors I slew in battle. Their possessions I carried away. Many captives I burnt with fire, many of their soldiers I took alive; of some I cut off hands and limbs, of others the noses, ears, and arms; of many soldiers I put out the eyes, I reared a column of the living and a column of heads. I hung up their heads on trees; their boys and girls I burnt; I destroyed the city, burnt it." It should be added that this same king was a great builder and did much to promote artistic work, both sculptural and architectural of a very high standard. The next king, Shalmaneser III, reigned for thirty-five years (860-825 B.C.),

and that period may be described as one continuous military expedition, for every one of those years, certainly down to the thirty-first, was crowded with wars, conquests or defeats; there was a rebellion in the last years of his reign. From 783 B.C. onwards to 745 B.C. Assyria was under an eclipse, and the kings of these times, having nothing great to write about, left no inscriptions.

(3) *Final Period, 745-607 B.C.* Assyria was saved from what might have proved a radical revolution by the strong hand of a leading general whose name and descent are unknown, but who by a happy inspiration assumed the title Tiglath-pileser, usually called the fourth of that name, and who lived up to the reputation of Tiglath-pileser I. He brought under his sway Armenia, Syria, Palestine, N. Arabia, and other countries; he reorganized the Assyrian army and made it the most effective military machine in the world. He was the first to adopt the principle of deporting a conquered people to parts of his dominions where the inhabitants were loyal, thus destroying the old feeling of local patriotism. A new administrative system was introduced, Nineveh being made the centre of government, and the king presiding over a kind of cabinet.

The Destruction of Samaria

The reign of Shalmaneser V (727-722 B.C.) was brief and inglorious, and is only interesting because in it Samaria was besieged for three years, falling a few months after the king's death. He was followed by four rulers, each the son of his predecessor, under whom Assyria reached the very acme of its greatness. Sargon II (722-705 B.C.) was, like Tiglath-pileser IV, a usurper and also a distinguished general. Each, however, was just the man required at a crisis in his country's history. Shortly after he had become king, Samaria surrendered and was destroyed, the best of its population being exchanged for loyal Assyrians. These Israelites mingled with the people among whom they were placed and are lost to history from that time onwards. This king carried on many wars and was almost uniformly victorious. The efforts of the ambitious and restless Chaldaean prince, Merodach-baladan, to secure the throne of Babylonia were frustrated.

Sargon's campaigns in Armenia, Asia Minor, Syria, Phoenicia, and Philistia were a series of triumphal processions. It was during a military campaign, probably, that he was assassinated, and was suc-

ceeded by his son Sennacherib (705-681 B.C.). Though less distinguished as warrior and administrator than his father, he was able to keep intact the empire which he had inherited, notwithstanding many revolts, especially in Babylonia, where the irrepressible Merodach-baladan was seeking to stir up strife, that being probably his business at the court of King Hezekiah. (See 2 Kings 20 and Isaiah 39.)

Annexation and Loss of Egypt

Esarhaddon, Sennacherib's son (681-668 B.C.), added Egypt to the Assyrian empire and organized it for purposes of government into 22 nomes or provinces. Assyria was now greater in extent, power, and prestige than it had ever been. For the first time in her history Assyria proper, Babylonia, Mesopotamia, Egypt, and the stretch of territory between were under one government—that of the Assyrian king, still called, however, by the old name Sharru. Yet at the very moment clouds were arising in the sky that were the harbingers of her total eclipse. From the N. and E. powerful peoples with unexhausted energies and courage amounting to ferocity were threatening her borders, sometimes even crossing them. These were the Medes, the Scythians, called on the monuments Ashguzeans, i.e. the Ashkenaz of the Old Testament, and also the Kimmerians, identified by many with the Cymry or Welsh. All these peoples were Aryans.

Esarhaddon had bequeathed his vast empire to his two sons—Assyria and the suzerainty of the rest to Ashurbanipal, who succeeded him, and Babylonia to another son. When Ashurbanipal, the Sardapalos of the Greeks and the Asnapper of Ezra 4, ascended the throne, Egypt threw off its allegiance, but was soon subdued, Thebes, the No Amon of Nahum 3, being captured. But in a few more years Egypt was lost, never to be regained. Other parts of the Assyrian empire were now tottering to their fall. Assyria had been won, and had to be held, by the sword, and this king was no warrior, though he was a great bookman and brought together at Nineveh thousands of clay books treating of science, philology, history, and religion. His brother of Babylon declared his independence of Assyria, but was soon conquered and committed suicide. His two successors were weak in every way, for the very year after he died, Nabopolassar, a Chaldaean prince, became king of Babylon and the surrounding country, adding continually to his gains.

In 607 B.C. the Medes under their king Cyaxares and the Babylonians under Nabopolassar made a united and successful attack upon Assyria. Nineveh was taken and destroyed, and its very name disappeared from human knowledge until its remains were discovered by explorers early in the 19th century. Thus passed away, in 607 B.C., the greatest military power that the world has ever known. Its language ceased to be spoken and written, and no attempt was ever made to revive the national life.

It may be said in general that the intellectual and religious culture of the Assyrians is of Babylonian origin, having been brought by the Assyrians from their ancient home in Babylonia. They however, modified what they took over and, in a measure, improved it.

LANGUAGE AND LITERATURE. The Assyrian language is essentially the same as that of Babylonia, differing only dialectically. Both are Semitic, closely allied to Hebrew, and in a less degree to Arabic. The cuneiform script employed in Sumerian, Persian, Cappadocian, as well as in Assyrian and Babylonian, was peculiarly suitable for Babylonia, where the writing material was clay and the writing-tool a kind of stylus. It was also suitable for Assyria, which copied, though without the same necessity, the Babylonian custom of writing on clay, which was afterwards dried either in the sun or in kilns. The literature of the Assyrians was comprehensive, though the art of writing in prose or poetry in the lofty style of Greek, British, and other writers was hardly attempted. What Assyrian and Babylonian writers aimed at was the communication of facts and ideas, not the production of aesthetic or even ethical impressions upon the mind.

Babylonian and Assyrian Libraries

Assyrian literature consists in the main of dried bricks or tablets, and of inscriptions on the walls of palaces, temples, and rocks. The early Babylonians had libraries, chiefly of brick books, at most of their important centres, and the Assyrians copied them in this as in so many other things, for there were such libraries at Calah, established about 1300 B.C., and at Asshur; but the best preserved of all ancient oriental libraries is that founded at Nineveh (Kuyunjik) by Ashurbanipal (668-626 B.C.). For this library the king sent his scribes to Babylon and other great literary centres to purchase or copy important books. Much of the contents of that library is now housed in the British Museum. The literary products of Assyria and Babylonia may be thus

arranged: (1) Linguistic: lexicons, grammars, etc., of Sumerian, Babylonian, and Assyrian. (2) Geographical: lists of countries, cities, etc. (3) Scientific: books on astronomy, astrology, mathematics, medicine, etc. (4) Historical. (5) Magic.

GOVERNMENT. The Babylonians and Assyrians were upholders of the monarchical form of government, and believed in the divine right of the king to rule. Indeed, in the early years of the Babylonian monarchy the king was first of all a priest, and to the end, in both countries, he was the head of both church and state.

COMMERCE AND INDUSTRY. Among the Babylonians and Assyrians there were craftsmen, workers in ivory, silver, and gold, weavers, potters, glassblowers, and especially builders and artists. Babylonia is the original home of wheat, which grows there wild and in abundance. Enamelled bricks were first made in that country, and none more beautiful have ever been known than some discovered in the ruins of the two countries between the rivers. We know of at least one great commercial bank established in Assyria about 900 B.C., which carried on extensive operations for centuries. Since Babylonia and Assyria lay along the trade routes between India and China on the one hand, and Egypt, Syria, and the extreme north on the other, they had great opportunities for establishing commercial relations with other countries, and they made fairly good use of them.

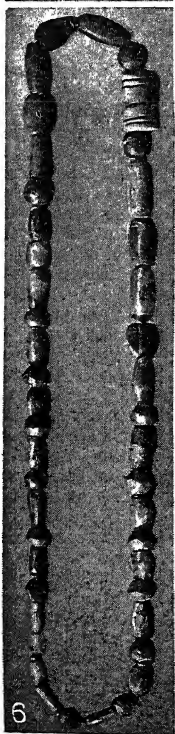
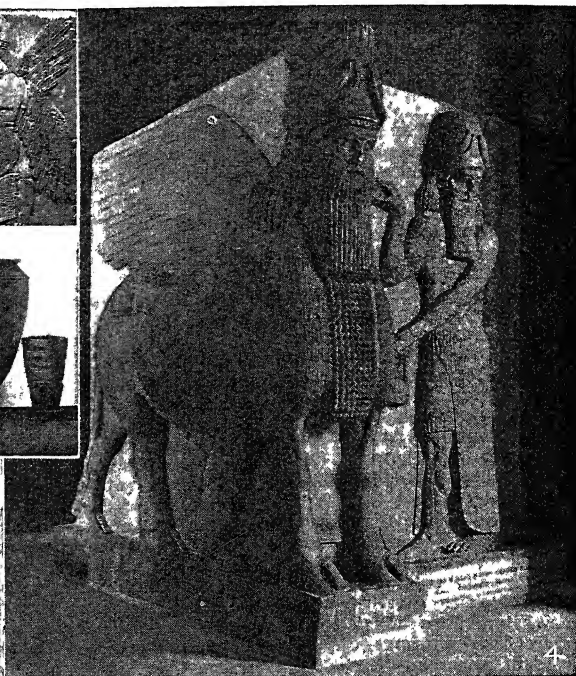
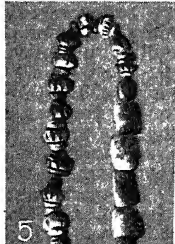
SCIENCE AND INVENTION. The Babylonians and the Assyrians were great astronomers, predicted eclipses, to them always ominous of disaster, and distinguished between the planets and the fixed stars. By the 7th century B.C. they were able to trace the course of the sun through the twelve stations of the zodiac. They were also great mathematicians; their skill in astronomy proves this, and it is further proved by mathematical tablets which have come down to us. These peoples made a special study of medicine. They classified diseases, noting their causes and prescribing remedies; but their science of medicine, as that of astronomy, was a good deal mixed up with superstition. Disease was thought to be largely the work of evil spirits, and the remedy consisted in either driving them out or in making them harmless by charms, incantations, or even by drugs. All education was confined to the upper classes. The only schools were those connected with the temples, the priests being the teachers, the subjects reading and religion. Writing was a difficult and elabor-

ate process, as there were nearly a thousand signs to be mastered, and only those intended to be scribes by profession learnt it.

ART. The character of Babylonian and Assyrian art was determined almost entirely by the materials on which the artists worked. There were no rocks in Babylonia, and it was almost impossible to obtain stone from distant countries owing to expense and difficulty of transport. So the Babylonian artists had to work in clay, and though in Assyria there was an abundance of stone, hard and soft, Assyrian artists were so much dominated by Babylonia that they built palaces, etc., with bricks, and their walls were made of decorated bricks. There were, however, exceptions in Assyria, especially in the later years of the kingdom, and it should be added that this people used stone, alabaster, limestone, etc., for statues, altars, and for the slabs with which they decorated their great edifices. No specimens of dressed stone from among Babylonian and very few from Assyrian remains have come down to us. Columns of solid stone appear in Assyrian edifices only, and in them exclusively as decorations in front of palaces and temples.

The Palace of Sargon II

Their architecture included that of palaces, temples and tombs, but it may be said that only the ground floor of either palace or temple has survived to modern times. We are left to speculate as to the character and number of the upper rooms. The most characteristic feature is the palace, of which we have many descriptions and some drawings, though nearly all the palaces portrayed by Assyrian artists were foreign. Of the private buildings of these Mesopotamian peoples we know nothing, as the inscriptions are silent about them and no remains have been found. The most completely preserved Assyrian palace is that built by Sargon II in his new capital, Dursharrukin (Sargon's fortress), i.e. the modern Khorsabad, 10 m. N. of Nineveh. It consisted of a series of rectangular halls of one storey with long corridors enclosing inner courts. The entrances were flanked by colossal human-headed bulls. The inner walls were lined with enamelled bricks and also with alabaster slabs on which were bas-reliefs of the most beautiful description. It covered over 23 acres of ground, had 200 apartments, and more than 300 open courts. The unfortunate feature of all Assyrian palaces is that, being built of sunburnt brick, they

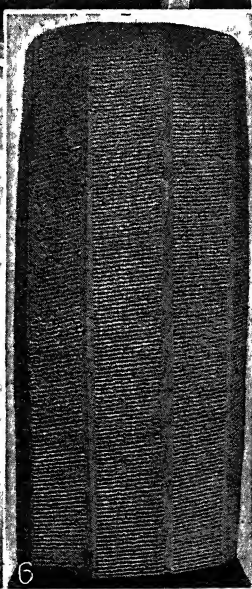
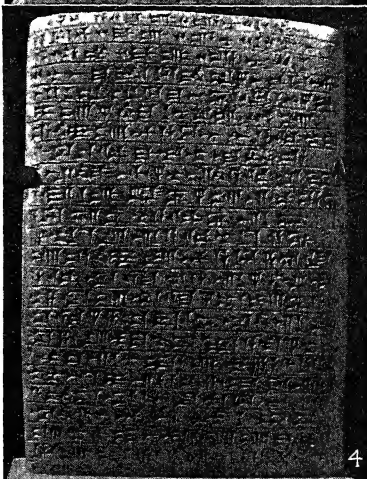


1. Winged figures kneeling beside a sacred tree 2. Group of terra cotta vases, cups, and other vessels 3. Stone model of a basket held in the hands of deities from a statue. 4. Figures of a man and of a human-headed

winged bull from the palace of Sargon, King of Assyria, 722-705 B.C. 5 and 6. Necklaces made of various stone, glass, and porcelain beads 7. Assyrian chief deity holding a basket 8. Deity holding a flower

ASSYRIA SCULPTURE AND ORNAMENT FROM THE ANCIENT EMPIRE

British Museum



1 Ashurnatsirpal, Assyrian monarch with an attendant 2 Stone inscribed with the name and titles of Puduia king of Assyria 1350 B.C. 3 Brick of Irishum, governor of Assyria of about 2000 B.C. 4 Alabaster

slab inscribed with the history of Ashurnatsirpal, 9th century B.C. 5 Monolith of a King 6 Ten sided cylinder of Ashurbanipal 7th century B.C. inscribed with his history 7 Inscribed bas relief of Ashurbanipal

ASSYRIA REPRESENTATIONS AND RECORDS OF ITS GREAT RULERS

British Museum

have not survived with anything like the completeness of Egyptian temples, but enough remains in the various mounds to show how vast and magnificent they were.

Next in importance to the palaces were the temples, which were built always upon high ground, the characteristic form being that of staged towers. First there was the quadrangular base, surmounted by another storey of similar form but smaller, and so on to the third, fourth, or even seventh storey.

Temples "as High as Heaven"

This pyramid-like building was called by the Mesopotamian people *ziquurat*, or *ziggurat*, i.e. a conspicuous house. The tower of Babel must have been one of these, and indeed in an inscription Tiglath-pileser I boasts that he had made the summits of his temples "as high as heaven." Their loftiness may have been due to religious considerations: compare the idea of the Indians and Greeks that the gods lived on mountains, and the high places of the Old Testament. But perhaps we are to account for this feature of the Assyrian temple on utilitarian grounds; the higher the buildings, the safer were they from the floods and miasmata below.

The oldest *ziquurat* which has yet been found is that of Nippur, this dating from 2700 B.C. at latest. Excavations show that attached to these pyramid-like temples were courts, altars, and entrance pillars, closely resembling those of the Jerusalem temple. No tombs with any claim to artistic beauty have been discovered in Mesopotamia. In Egypt the tombs are far more important and the remains much more substantial and abundant than those of the palaces.

Assyrian sculpture had no infancy. Received from the Babylonians, it began almost as fully developed as it remained. The examples of Assyrian sculpture are to be seen chiefly on the slabs of alabaster, etc., that covered the walls of palaces and temples, but they were also engraved on rocks in their natural position. Both Babylonian and Assyrian sculptors worked in bas-relief, hardly ever in the round, though among the Assyrians there are many specimens of statues in solid stone. The palace decorations were of two kinds: (a) historic, battle-fields, the chase; (b) royal attitudes, the king being represented in his various occupations and amusements, performing religious rites, etc. Almost all Mesopotamian sculptures were prompted by royalty and lauded the royal person and his doings.

Both Babylonian and Assyrian

sculpture had serious defects. Human figures were hardly ever differentiated, even though the individuals belonged to different races. The king, however, was always made taller than anybody else, whatever may have been his actual size. All pictures were in profile, but the artist gave each individual a full eye. The artists had no sense of perspective. When drawing a four-legged animal they would give it five legs, in order that four might be seen from every point of view. The nude was always avoided and therefore the delicate portraiture of the human body and its drapery, so characteristic of Greek art, is lacking. Assyrian sculpture began in the reign of Tiglath-pileser I and reached its apogee in the reign of Ashurbanipal. It is remarkable that when the Assyrian Empire came to its end, the art of the country was at its highest and promised most. Its last great king, Ashurbanipal, did more for it than any other, but his absorption in intellectual and religious pursuits led to the downfall of his country and with that downfall there came to an end the language and culture of Assyria.

Colour and Ornament

The fine art of painting in the modern sense did not exist among the peoples of Mesopotamia. The walls of palaces and of temples were coloured chiefly in blue and yellow, and many portraits and historical and other scenes were drawn on bricks, enamelled or otherwise, and on slabs of stones. But all colouring among these artists was ornamental. It was not used, as in modern art, for the conveyance of artistic impressions. The beauty of temples and especially of palaces was greatly augmented by precious stones and coverings of gold and silver. Some very fine specimens have come down to us of decorated pebbles and shells, and also of seals, of cylinders enclosing deeds, gems, and of ornaments in stone and in the precious metals, as well as in bronze and wood.

RELIGION. The religion of the Assyrians was virtually that of the Babylonians, the main difference being that in Assyria the principal god was Asshur, the principal god of the Babylonians after about 2000 B.C. being Marduk (Merodach), the tutelary deity of Babylonia, whose character was far more ethical and gracious than that of Asshur.

Next in importance was Ishtar (Istar), like Aphrodite a goddess of love and war, the latter aspect being more especially emphasised among the war-like Assyrians.

Other Assyrio-Babylonian deities were Dagon or Dagan, whose name and functions are obscure; Hadad or Adad, also known as Rimmon, the god of storms; Shamash, the sun-god, and Sin, the moon-god; and Nergal, the god of destruction, chiefly of war and the chase.

The spiritual beings recognized, feared, and to some extent worshipped by these two Mesopotamian peoples may be described as (1) evil spirits—a survival of the primitive animism of the Sumerians; (2) astral gods—sun, moon, etc.; (3) gods representing natural elements or forces, such as fire, water, etc., and others which cannot be categorised. This ancient religion was polytheistic in that each city had its own deity, but with the progress of thought Asshur and Marduk became each the supreme deity of his own country, inferior gods being regarded as merely their representatives, so that there came an approach to monotheism. Yet anything like the ethical and absolute monotheism of the Hebrews is entirely absent from the religions of Mesopotamia. One result of the belief in evil spirits, supposed to be the causes of all diseases and of every kind of disaster, was that an enormous number of magical contrivances were employed to counteract the supposed nefarious working of these demons.

Sacrificial Worship

Worship in Mesopotamia consisted of sacrifices—animal, cereal, liquid (wine), and incense—agreeing closely with the sacrifices of the ancient Hebrews. These were offered to the superior gods, but the offerer had his share of the repasts to which he invited his deity. Prayers for protection against evil spirits accompanied the sacrifices. But in order to neutralise the power of evil spirits these peoples resorted to incantations; certain formulae were recited, even words were regarded as countercharms if recited with perfect accuracy; but the smallest error in any part of the enchantment meant the impotence of the whole. They had no ethical doctrine of sin; what offended the gods was the omission of the proper ceremonial, or the defective performance of the whole. They had no doctrine of a future life of happiness or misery, depending upon the life lived in this world. All human beings go, at death, to the land of no return called Arallu, which corresponds to the Greek Hades and the Hebrew Sheol. It was a gloomy world where its people lived a ghostly life, semi-conscious and never happy. The blessed isle of Babylonian

and Assyrian mythology was shut to all except a few of the more favoured gods.

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Astacus. A genus of decapod Crustacea. *Astacus fluviatilis*, the crayfish (q.v.), is the common British form found in streams.

Astaire, FRED (b. 1900). An American dancer and actor. Born Fred Austerlitz, May 10, 1900, at Omaha, he began his career in a dancing team with his sister Adele, thus founding a partnership which achieved brilliant success in New York and London. They appeared in London in *Stop Flirting*, 1923; *Lady Be Good*, 1926; *Funny Face*, 1928. In 1931 Adele Astaire (b. Sept. 10, 1898) married Lord Charles Cavendish and announced her retirement from the stage. Fred Astaire subsequently starred

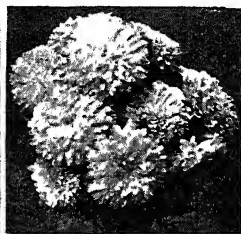
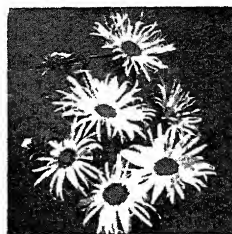
in such outstanding films as *Roberta*, 1935; *Top Hat*, 1936; *Story of Vernon and Irene Castle*, 1939; *Holiday Inn*, 1942 *Blue Skies*, 1946; *Easter Parade*, 1949; *The Barkleys of Broadway*, 1949, in which Ginger Rogers was, as often before, his dancing partner.

Astartê. Principal female deity of the Phoenicians, her male counterpart being Baal. She is identified with the Ashtoreth of the O.T. (1 Kings 11 and 2 Kings 23), with Ishtar, the Assyrian goddess, and Hathor, the Egyptian goddess. Her worship, attended by licentious rites, spread from Phoenicia among the Greeks, and in course of time Astarte became identified with the Greek goddess of love, Aphrodite.

Astartê. Marine bivalve mollusc belonging to the family Cyprinidae. Several species are found off the British coast, and form a favourite food of the cod.

Aster (Gr., star). Large genus of mainly perennial herbs of the family Compositae. Natives of most temperate and cold regions of the earth, especially America, they have undivided leaves and daisy-like flower-heads, the disk-florets of which are always yellow, and the ray-florets lilac, blue, purple, or white. From their general habit of flowering in autumn they are popularly known as Michaelmas daisies, and extensively grown in gardens. The garden plants known as China asters are annuals belonging to another genus (*Callistephus*).

Asteria. Name given to certain rubies and sapphires. These, known as star rubies and star sapphires, appear to be divided by six rays, spreading from the centre to the



Aster. China aster, a familiar garden flower. Left are blossoms of a single, and right those of a double variety

the birthplace of Apollo and Leto (Latona).

Asterisk (Gr. *asteriskos*, little star). Mark (*) in printing or writing to indicate a marginal reference or footnote, the omission of a letter, word, or words, or, placed at the foot of a page, to indicate, for binders' guidance, an inset. In guide-books places of special interest are indicated by an *; and the mark is used with an obelus or dagger (†) in lists of names to denote respectively the birth or death of a person. Some-



Astaire. Film sequence of Fred Astaire dancing in "Roberta." This American tap dancer, who has starred in several successful films, possesses great agility and remarkable technique

edges. This is probably due to the presence of small channels in the stones or to an arrangement of twin lamellae. Though very beautiful when the stones are properly cut (*en cabochon*), the peculiarity does not add to the market value of really high-class stones.



Astarte, from an ancient bronze statuette

Asteria. In Greek mythology, daughter of one of the Titans. When pursued by Zeus, she was changed into a quail, flung herself into the Aegean Sea, and became a floating island, called Asteria, star island, or Ortygia, quail island. Later, this was known as Delos,

times the * in such a list indicates death (cf. "Ye, against whose familiar names not yet The fatal asterisk of death is set," Longfellow's *Moriturus Salutamus*, stanza 12). In reference books and printed programmes the sign may indicate some attribute which is common to several entries, thus saving repetition.

Roger North (1653-1734) makes use of the word asterisk as both noun and verb: "The lantern is in the centre of an asterisk of glades" (*Life of Lord Guilford*); "I need not asterisk the quaint words" (*Examen*). The Alexandrian grammarians employed the asterisk, with the addition of the obelus, to indicate that the text was spurious.

Asteroids (Gr. *astēr*, star; *eidos*, form). Name given to the thousands of minor planets, which revolve round the sun between the orbits of Mars and Jupiter.

With one exception (Vesta) their light, which is reflected sunlight, is too faint to be visible to the unaided eye. Their mean position is that predicted by Bode's law (*q.v.*) for a planet, but the first to be discovered, Ceres, was not found till 1801, nearly 30 years after the law was first stated. Dozens are at present discovered each year by photography, and over 2,000 are now known, ranging in diameter from 480 m. (Ceres) to a few miles. In total mass they are probably less than one-thousandth that of the earth. They may be fragments of a former planet destroyed by some cataclysm, or perhaps primeval bodies which have failed to coalesce into a planet.

On account of their highly elliptical orbits, some of the asteroids may approach the earth closely at certain points. Eros came within 17 million miles in 1931, when photographs were taken at observatories all over the world to obtain its distance, and thence, by calculation, the scale of the solar system. Since 1932, asteroids have been discovered which may make still closer approaches: Amor can come within 10 million miles, Apollo within 7, Adonis within 1, and Hermes may even come closer to us than the moon does. A collision between the earth and a flying mass of rock a few miles across would be catastrophic, but the probability of such an event is extremely low. See Astronomy; Planet; Star; Sun.

Asthma. A disease characterised by sudden paroxysms of difficult breathing, occurring often at night when the patient is asleep. He awakens fighting for breath, often blue, sweating, and frightened. Sometimes he goes to the open window, gripping the sill to assist respiration. Attack may be preceded by a sensation of tightness in the chest and by mental depression. The difficulty is in expiration, which is prolonged and wheezing. Although the chest is greatly expanded, respiration is shallow. These symptoms are caused by severe narrowing of the smaller air passages, due to spasm of the bronchial muscles, swelling of the mucous membrane, or excessive secretions, or any combination of these. The attack is rarely fatal of itself, and, untreated, lasts 1 to 2 hours, ceasing suddenly, the patient coughing up much sputum.

There are many causes of asthma, in all of which a hereditary predisposition is of great import-

ance. Asthma may be due to irritation of the respiratory tract from such causes as nasal polypi or malignant disease, or more commonly to allergy to foods or inhaled substances. Some cases are psychological. In treating the disease, relaxation of the bronchial musculature is the immediate object, and is achieved by the use of anti-spasmodic drugs such as adrenalin and ephedrin. To achieve fundamental cure, the primary cause, such as irritation or the allergic factor, must be removed. In 1928 an asthma research council was instituted.

Asti. City and episc. see of Italy, in Asti prov., Piedmont. It stands on the Tanaro, 34 m. by rly. E.S.E. of Turin. The ancient Asta Pompeia, it has a cathedral dating from the 13th and 14th centuries, in the left aisle of which are two fine altar-pieces by a master of the Vercelli school; the church of San Giovanni, built over a 6th century Christian basilica; and an 11th century baptistery. The birthplace of the poet Alfieri (1749-1803, *q.v.*), it has an Alfieri museum, in the house in which he was born, and a statue. Manufactures include silk, leather, hats, and matches, and it is celebrated for its horticulture and sparkling wine (see Asti Spumante). Anciently famous for its pottery and for its 100 gates, many of which remain, it was a powerful republic in the Middle Ages, but was razed by Frederick I in 1155. It was successively held by the family of Visconti and by the king of France, from whom it passed to the duke of Savoy in the 16th century. Pop. 48,898.

Astigmatism (Gr. *a*, not; *stigma*, a mark). Defect in the refracting surfaces of the eye. It most frequently occurs in the cornea, but sometimes in the lenses, which are unequally curved in different directions. The result is that rays of light are not all focused at one point, and vision is blurred. The condition can be corrected by the use of cylindrical glasses. See Eye.

Asti Spumante. A wine of Piedmont, Italy, so named from Asti, the city of export. It is made from a species of muscatel grape, and, though too sweet for English taste, is highly esteemed in Italy. The wines of Asti are red and white, still and sparkling (Ital. *spumante*, frothing).

Astle, Thomas (1735-1803). British antiquary. Born in Staffordshire, Dec. 22, 1735, he was

engaged on editing the rolls of parliament, 1770-77. He was keeper of the records, 1783-1803, and died Dec. 1, 1803. Besides his official reports on the documents in the Tower of London, Astle was the author of *The Origin and Progress of Writing*, 1784, a valuable contribution to the study of medieval handwriting.

Astley, Jacob Astley, Baron (1579-1652). An English royalist soldier. Of a Norfolk family, he was in early life a soldier of



1st Lord Astley,
Royalist soldier
Contemporary print

fortune in the Netherlands, Denmark, and Germany. Having returned to England, he was made governor of Plymouth, after which he was actively engaged at Newcastle in preparing to oppose the Scots. Being a member of the council of war, he remained there almost until the outbreak of the Civil War, 1642.

In that struggle Lord Astley took a prominent part. He fought for Charles at Edgehill and at the second battle of Newbury; helped to besiege Gloucester and to take Reading and Arundel; and was with the king when he escaped from Oxford. He commanded the royal foot at Naseby, and made the last royalist stand at Stow-on-the-Wold, March, 1646. He was imprisoned for a short time, but had been set at liberty when he died at Maidstone in Feb., 1652. Charles I had created him a baron, but the title became extinct on the death of his grandson in 1668.

Astley, Philip (1742-1814). English equestrian and circus manager. Born at Newcastle-under-Lyme, Jan. 8, 1742, and brought up as a cabinet-maker, in 1759 he joined General Elliott's light horse in Holland during the Seven Years' War as a breaker-in and rough-rider. After serving with distinction, he went round England giving exhibitions of horsemanship, in which his son later joined him. At different periods he had various amphitheatres in London, Dublin, and Paris, including Astley's Royal Amphitheatre near Westminster Bridge. He died in Paris and was buried in Père-Lachaise. Consult Greatest Show on Earth, M. Willson Disher, 1938.

Aston, WALTER ASTON, BARON (1584-1639). English ambassador. The eldest son of a wealthy Staffordshire knight, he was one of the first baronets created by James I, and in 1627 was raised to the Scottish peerage by Charles I. He was twice ambassador to Spain, 1620-25



Walter Aston,
1st Baron Aston

and 1635-38, and is remembered as the patron of Drayton the poet. He died Aug. 13, 1639.

Aston, FRANCIS WILLIAM (1877-1945). British scientist. Born at Harborne, Birmingham, Sept. 1, 1877, he was educated at Malvern College and Birmingham and Cambridge universities. He was assistant lecturer in physics at Birmingham in 1909 and entered Trinity College and Cavendish laboratory, Cambridge, in 1910. He was a technical assistant at the government experimental station at Farnborough, 1914-19. In 1920 he was awarded the Mackenzie Davidson medal of the Röntgen Society; in 1922 the Nobel prize for chemistry for his work in connexion with isotopes; in 1938 the Royal medal of the Royal Society, to which he was elected in 1921. The production of the atomic bomb was greatly assisted by his work on isotopes. His published works include *Isotopes*, 1922; *Mass-spectra and Isotopes*, 1933. He died at Cambridge, Nov. 20, 1945.

Aston Manor. Former municipal and parl. borough of Warwickshire, England. In 1911 it was incorporated with Birmingham and forms one of its parliamentary divisions. Its manufactures include arms, cycles, and motors. Aston Hall is now a museum and art gallery, and the adjoining grounds, opened to the public 1858, contain the Aston Villa football ground. Market day, Thurs. Pop. 35,612. See Birmingham.

Aston Villa. English Association football club founded in 1874, by members of Aston Villa Wesleyan Sunday school, Lozells, Birmingham. After consistent successes in local competitions over several years, the club adopted professionalism in 1886-87, when it won the F.A. Cup for the first time. One of the founders of the Football League, it won in 1910 the League championship for the sixth time, and in 1920 the F.A. Cup also for the sixth time. It shared with Preston North End the distinction

of winning both competitions in one season (1896-97). The club originally played at Perry Barr, but in 1897 moved to the present ground, Villa Park, Aston.

Astor, WILLIAM WALDORF ASTOR, 1ST VISCOUNT (1848-1919). Anglo-American financier. A great-grandson of John Jacob Astor, he was trained as a lawyer, and when quite young became manager of the Astor estates in New York. In 1878 he was elected to the legislature of New York State, but did not succeed in entering Congress. He was U.S. ambassador to Italy, 1882-85, and in 1899 was naturalised in England, which had been his home since 1890. In England he was chiefly known for his large donations to war charities, as the owner of *The Pall Mall Gazette* and *The Observer*, and as the purchaser of Cliveden, a beautiful estate on the Thames, and Hever Castle, in Kent. In 1916 he was made a baron and in 1917 a viscount. He died at Brighton, Oct. 18, 1919.

His eldest son, William Waldorf Astor, 2nd viscount (b. 1879), was educated at Eton and New College, Oxford, and elected M.P. for Plymouth in 1911, retaining his seat until he succeeded to the peerage in 1919. He served in France during the First Great War. In Aug., 1919, he became parliamentary secretary to the ministry of Health, having taken a leading part in the fight against tuberculosis. From 1939 to 1943 he was lord mayor of Plymouth, and actively exerted himself in the cause of reconstruction and post-war planning. Like his father he became owner of *The Observer*.

Astor, NANCY WITCHEL ASTOR, VISCOUNTESS (b. 1879). Anglo-American politician. She was

the daughter of C. D. Langhorne, of Mirador, Greenwood, Virginia, U.S.A., and sister of Irene, wife of Charles Dana Gibson (q.v.). In 1906 she married W. Waldorf Astor, afterwards 2nd Viscount Astor. Primarily interested in social work, temperance reform, and child welfare, she helped her husband in his political career, and when he succeeded his father in the house of lords, Lady Astor was chosen as Coalition candidate for his constituency, the Sutton division of Plymouth. On Nov. 28, 1919, she was elected M.P. and took her seat on Dec. 1, the first woman to sit in the British House of Commons. She represented her constituency until in 1945 she retired from parliament. In 1937 Lady Astor was made a Companion of Honour.



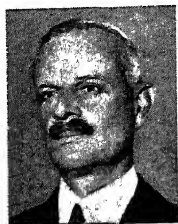
Lady Astor,
Anglo-American
politician

Astor, JOHN JACOB (1763-1848). American merchant and founder of the wealthy family of that name. Born near Heidelberg, of humble parentage, Astor went to New York in 1783 and acquired a fortune by trading with the Indians for furs. His business grew rapidly; he founded Astoria in Oregon as a trading centre, and sent his wares all over the world. Much of his wealth was in land in New York City, which increased enormously in value during the 19th century. His chief heir was his son William Backhouse Astor (1792-1875). A great-grandson, another John Jacob Astor (1864-1912), a man of versatile gifts, was drowned when the Titanic was lost in 1912.



Aston Villa. The team that won the Football Association Cup in 1886-87. Back row (left to right): F. Coulton, F. Dawson, G. Kynoch, M.P. (president), J. Warner, R. Davies, J. Burton. Middle row: D. Hodgetts, H. Vaughton, A. Hunter, J. Simmonds. Front row (on ground): H. Yates, A. Brown

Astor, JOHN JACOB (b. 1886). English newspaper proprietor. The youngest son of the first Viscount



J. J. Astor,
English newspaper
proprietor

He represented Dover as Conservative M.P. from 1922 until his retirement in 1945. In 1922, after the death of Viscount Northcliffe, he acquired a controlling interest in *The Times*. He became president of the Press Club, chairman of Middlesex Hospital, and a director of the G.W.R. He was a distinguished sportsman, notably in rackets. In 1916 he married Lady Violet, daughter of the 4th earl of Minto and widow of Lord Charles Mercer Nairne. His residence, Hever Castle, Kent, was the scene of an annual garden party for his employees.

Astoria. A city and port of Oregon, U.S.A., in Clatsop co. It is on the S. side of Columbia river, about 9 m. from the open sea. Grain and lumber are exported; the canning of salmon is a big industry, and there are manufacturing establishments. Astoria owes its origin and its name to John Jacob Astor (1763-1848), who here founded the first station for the collection of furs. For some years it was in possession of the English. It became a city in 1876. Pop., 10,389.

Astrabad or **ASTERABAD.** Prov. of Persia. It is bordered on the N. by the Caspian Sea and on the S. by the Elburz Mts. Mountainous and well wooded, it contains many fertile valleys which produce wheat, rice, and other cereals.

Astrabad or **ASTERABAD.** Town of Persia. The capital of Astrabad prov., it lies at the foot of the N. slope of the Elburz Mts., about 20 m. E. of Astrabad Bay in the Caspian Sea. Enclosed by a mud wall about 3 m. in extent, largely in ruins, it was once the residence of the shahs, and has remains of a fine palace. Its exports include rice, cotton, and carpets. From its unhealthiness it has been called the City of the Plague. Pop. 22,000.

Astraea (star-maiden). In Greek mythology, daughter of Zeus and Themis. The last of the deities to

leave the earth at the beginning of the Iron or Bronze Age, after her return to Olympus she was placed among the stars as the constellation Parthenos or Virgo. Dryden's poem *Astraea Redux* (Astraea brought back) celebrates the Restoration as the revival of a Golden Age.

Astragal (Gr. *astragalos*, ball of the ankle joint). Architectural term for a small rounded moulding at the top or base of a column, usually with a bead or leaf design.

Astragalus. Second largest bone of the foot, at the summit of the arch. It articulates with the bones of the leg to form the ankle joint and receives the weight of the body, when the latter is in a standing position.

Astrakhan. Skin of certain lambs. When this is cured and the short curly wool dyed, the so-called fur is very suitable for clothing. The natural skin is imitated in astrakhan woven and knitted goods, in which curls of mohair are supported upon a foundation of threads. In artificial astrakhans of one type the pile yarns are curled before weaving by being twisted into rope form and boiled. In another type the mohair curls are burst from the groundwork by milling, or hammering, the cloth.

Astrakhan. City of R.S.F.S.R., in Stalingrad region. It is situated on an island of the Volga river, about 50 m. from the Caspian Sea. The seat of Greek and Armenian archbishops, it is divided into three parts, the Kreml, or citadel, the White City, and the suburbs. In the Kreml are the massive cathedral, dating from the time of Peter the Great, and the archiepiscopal palace; the White City contains the bazaars and most of the administrative buildings. There are Greek, Roman Catholic, Armenian, and Protestant churches, museums, educational institutions, and a large public library.

Astrakhan is the chief port on the Caspian and an important commercial town, attended yearly by many thousands of merchants. It imports raw cotton, fruits, rice, silk, and leather, and exports fish, caviare, petrol, cotton, and sugar. Its manufactured products include soap, candles, leather, and spirits, and it gives its name to Astrakhan (*v.s.*) fur.

Founded in 1395, it suffered at the hands of the Tartars, and was besieged by the Turks in 1569. Fires, epidemics, inundations, and earthquakes have caused much damage. Pop. 254,000.

Astral (Lat. *astralis*, belonging to a star). Term applied in ancient

times in the East to spirits which were believed to animate the stars and exercise a good or evil influence on human affairs. The belief was of Babylonian origin, and was current in the later Middle Ages among astrologers and alchemists.

In theosophy the term is used in an entirely different sense. There is supposed to be an intermediate condition of existence, or "astral plane," nearer the realm of spirit than of matter, which is believed to interpenetrate the material universe. It is akin to the *Anima Mundi* of the medieval philosophers. In this plane there are believed to be intelligent entities called astrals. See Theosophy.

Astralite. Explosive of German origin. In it trinitrotoluene is the active ingredient, with the addition of nitroglycerine to increase sensitivity to detonation. It is used for filling mortars, grenades, and similar weapons. The composition of astralite is ammonium nitrate, 84.5 p.c.; trinitrotoluene, 7 p.c.; nitroglycerine, 4 p.c.; wood meal, 1 p.c.; charcoal, 1 p.c.; paraffin oil, 1 p.c.; and other miscellaneous ingredients 1.5 p.c. Wetter astralite differs from this only in having 10 p.c. of the ammonium nitrate replaced by an equal weight of sodium chloride, whereby the flame temperature is decreased.

Astrid SOPHIE LOUISE THYRA (1905-1935). First wife and consort of Leopold III, King of the



Astrid, Queen of
the Belgians

Belgians. The third daughter of prince Charles of Sweden, and niece of king Christian X of Denmark, she was born in Stockholm on Nov. 17, 1905. She married Leopold III, then duke of Brabant, elder son of Albert, king of the Belgians, in Stockholm on Nov. 4, and in Brussels on Nov. 10, 1926. She had three children, princess Josephine, b. Oct. 11, 1927; prince Baudouin, b. Sept. 7, 1930; and Albert, prince of Liège, b. June 6, 1934. Queen Astrid met her death near Lucerne, Switzerland, as the result of a motor accident on Aug. 29, 1935, in which her husband, King Leopold, who was driving, was injured. In 1936 a memorial chapel was built at Küsnacht, close to the spot where she was killed. *Consult* Life, J. Cappe, 1937.

Astringents (Latin *astringere*, to bind fast). Drugs which cause contraction of vessels and thus lessen the amount of exudation from them. They are most often used to stop bleeding, but are also employed to check diarrhoea and reduce discharges from mucous membranes. Alum, salts of iron, and tannic acid are examples.

Astrographic Catalogue. A catalogue of several hundred volumes, giving the positions and brightnesses of all the stars in the sky, as far as those about 250 times fainter than the faintest visible to the naked eye. It was planned in 1887 by international cooperation amongst 18 observatories all over the world, and is only now nearing completion. It will contain information about nearly 4,000,000 stars derived from 44,000 photographic plates. In some zones of the sky the work has already been repeated to discover by how much the stars change their positions with the lapse of time.

Astrolabe (Greek *astron*, star; *labein*, to take). Instrument used by the Greeks and Arabs and in

theodolite. For astronomical observations the astrolabes used were more complicated and embodied various circles (armillary circles) the rims of which lay on the surface of a sphere; e.g. one circle would represent the horizon, another the equator, a third the ecliptic. The place of the astronomical astrolabe has been taken by the equatorial instrument.

Astrolabe Bay. Inlet on the N.E. coast of New Guinea. On its shore stands the port of Madang, called Friedrich Wilhelmshafen when the territory was German.

Astrology (Greek *astron*, star; *logos*, discourse). Pseudo-science concerned with a hypothetical connexion between the changing aspects of the stars and the changing course of human life, and thence with predicting events and advising on the conduct most likely to achieve desired ends.

The birth of astrology is lost in antiquity, but the prospect of practical guidance was probably the motive for the patient study of the stars which led eventually to the establishment of the science of astronomy. Thus astrology, like alchemy, gave birth to the science which supplanted it. The main assumption of astrology is evidently bound up with the primitive doctrine that the earth is the centre of the stellar universe. In the 17th century the heliocentric theory obtained general acceptance, and by completely altering the point of view from which the stars were regarded, deprived astrology of the credit it had formerly enjoyed among the learned.

There seems never to have been exact agreement among astrologers as to the rules of their art. The cardinal assumption was that a man's life was governed primarily by the aspect of the stars at the hour and place of his birth; this aspect was represented by a figure called a horoscope. For the purpose of the horoscope, the celestial sphere was considered in relation to the horizon visible from the birthplace, and divided in a way on which agreement was not general, into twelve parts called houses, six being above the horizon and six below. The most important part of the sky for the horoscope of the native was the ascendant, i.e. the first house below the horizon, and it was necessary to determine which planet, or sign of the zodiac ruled by a planet, occupied that house at the moment of his birth. The planet whose sign was rising and

therefore occupying the upper portion of the ascendant was called the "lord of the ascendant," and its peculiar influence was supposed to govern the native's destiny. The ruling planet had an intimate relation to the native's temperament; he might be, e.g. of a saturnine, a jovial, or a mercurial disposition—words which have permanently left the mark of astrological ideas on the English language. Consult *The Mystery and Romance of Astrology*, C. J. S. Thompson, 1929.

In modern times there has been a popular revival of the cult of astrology amongst the credulous. The modern astrologer's knowledge of astronomy is, however, usually defective. Cosmic happenings can and do influence certain terrestrial phenomena (see Sun), and the relevant connexions have been established by astronomical investigations carried out scientifically; but no such statistical investigation has ever been made to verify the basic hypothesis of astrology, which is regarded by all men of science as a baseless delusion.

Astrometry. The astronomy of position, which deals with the precise location of the heavenly bodies, both on the celestial sphere and in space, and with their real and apparent motions. Most astrometric work is now done by photography.

Astronomer Royal. Head of the Royal Greenwich Observatory. This institution was founded in 1675 by Charles II, to whom John Flamsteed became the first "Astronomical Observer." Subsequent holders of the office of Astronomer Royal have been Halley (appointed 1720), Bradley (1742), Bliss (1762), Maskelyne (1765), Pond (1811), Airy (1835), Christie (1881), Dyson (1910). The tenth holder, Sir Harold Spencer Jones, was appointed 1933. The Astronomer Royal for Scotland is head of the Royal Observatory, Edinburgh, which stands on Blackford Hill.

Astronomical Unit. The fundamental unit of astronomical distance, defined as the mean distance between the earth and the sun. The latest value (1941), determined by the Astronomer Royal from international observations of the minor planet Eros (see Asteroids), is 93,003,000 m. The unit is used for specifying distances in the solar system, but is much too small for convenience in expressing stellar distances. See Light Year; Parsec.



Astrolabe. The astrolabe of Regiomontanus, an instrument to measure the angular distance between two heavenly bodies

From the original made in 1468, in the Museum at Nuremberg

medieval Europe to take altitudes and to mark the positions and movements of sun, moon, and stars. In its simplest form it consisted of a circle with two radial pointers, one fixed and the other movable, and both fitted with sights; it thus measured the angle between two stars or between a star and the horizon. This simple form of astrolabe was called the "mariner's astrolabe," and was used by sailors until superseded in the 18th century by the quadrant, which finally gave place to the sextant; it was likewise used for land-surveying, where its place has been taken by the

ASTRONOMY AND ASTROPHYSICS

A. HUNTER, Ph.D., F.R.A.S., Royal Greenwich Observatory

A general survey of the history and present state of man's study of the universe. For more detailed information see the articles on Moon; Stars; Sun, etc., and on the different planets, stars, and constellations. See also biographies of astronomers: Copernicus; Eddington; Galileo; Herschel; Newton, etc.

Astronomy (Gr. *astron*, star; *nomos*, law) is the science which deals with the heavenly bodies. It treats of their positions and distances; their motions, real and apparent; their interactions with one another; their forms, dimensions, masses, and surface features; and their probable past and future history. The study of their physical condition, their radiation and constitution is spoken of as astrophysics (Gr. *physis*, nature). The two sciences have a single purpose, viz. to advance our knowledge of the universe, but their methods of attaining that purpose are different, and a fairly definite dividing line can be drawn between them.

Four Branches of Astronomy

Four main branches of astronomy may be distinguished: (1) astrometry, which deals with the determination of the positions and motions of the heavenly bodies; (2) theoretical astronomy, which includes the theory of eclipses, celestial mechanics, gravitational theory, the calculation of orbits and perturbations, stellar statistics, and mathematical studies generally; (3) descriptive astronomy, or the investigation of the heavenly bodies themselves, as distinct from their positions and motions; and (4) practical astronomy, dealing with the optics and mechanics of telescopes and auxiliary instruments, and with observational methods and errors. Astronomy is also closely concerned in the study of the earth (especially of its atmosphere and the tides), in geodesy and surveying, in navigation, and in chronology. It differs from most other sciences in being not experimental but observational. Astronomers are powerless to alter the conditions in the objects of their study; on the other hand they can observe heavenly bodies of almost every conceivable variety in almost every conceivable state.

The utilitarian value of astronomy is almost negligible: it is practically confined to accurate time-keeping for scientific work, to the preparation of almanacs for navigation, and to the prediction of certain phenomena in radio communication. But its cultural value can scarcely be assessed. Every civilization has

developed its study of astronomy to a pitch which is a good measure of the general level of culture attained. The impact of modern astronomy on mathematics has resulted in the development of methods (e.g. the calculus) of basic importance in such practical matters as engineering; it has been the testing-ground of many philosophies and physical hypotheses (e.g. relativity theory); and in the distant objects observed by the astronomer the physicist can verify his theories under extreme conditions unattainable in terrestrial laboratories. The modern observatory is the platform from which an earth-bound pygmy with an insatiable thirst for knowledge seeks to probe the uttermost recesses of the universe; and he regards any possible material advantage to be got from his work as incidental, if not irrelevant.

HISTORY. The beginning of astronomy is lost in antiquity. The practical desire to observe the heavenly bodies no doubt arose acutely when primitive peoples turned from nomadism to agriculture and felt the need for calendars to regulate their work. The first astronomers were probably priests, for celestial knowledge was their preserve; and early astronomy was bound up closely with religion and divination. Thus arose astrology (*q.v.*), the forerunner of astronomy, in such lands as Egypt, Persia, India, and China. Though Egyptian and Chaldean astronomers recognized the main observational facts of astronomy—the seasonal march of the constellations, the irregular motions of the planets, the sweep of sun and moon around the zodiac—their astronomy was confined to the preparation of numerical tables giving the positions of the sun, moon, and planets, and roughly predicting eclipses. There was no attempt to represent the motions by any geometrical model: no explanation of the observed facts.

The Greeks were the first to study astronomy systematically and to speculate how the universe might be constructed so as to give rise to the observed phenomena. From the observations of Hipparchus (c. 120 B.C.) they knew of

such matters as the precession of the equinoxes and the eccentricity of the sun's apparent orbit, and had a good idea of the moon's distance. Their theories culminated in the model universe described in the *Almagest* of Claudius Ptolemy (c. A.D. 150), who combined the rotating concentric spheres of Eudoxus (350 B.C.) with the epicycles (*q.v.*) of Apollonius (220 B.C.) into his geocentric theory, which was to persist for 14 centuries. This hypothesis postulated a fixed earth around which the heavenly bodies revolved daily. In addition to this diurnal motion, the sun and moon moved slowly round fixed circles somewhat eccentric to the earth; and the planets moved in small circles themselves carried round the earth on eccentric circles. The *Almagest* also included an expanded version of the star catalogue of Hipparchus with the stars arranged in order of brightness according to a system which, given some additional precision, is in use today.

Theory of Copernicus

Under the severely practical Romans astronomy stood still, and during the Dark Ages in Europe the science was kept alive by the Arabs, who were content to add minor improvements to the Ptolemaic theory as more precise observations showed them to be needed. With the Renaissance, Greek philosophy came under intense scrutiny in an awakened Europe. The Polish astronomer Copernicus in 1543 revived in an improved form the primitive (and hitherto rejected) heliocentric theory of Aristarchus (c. 280 B.C.) and postulated a fixed sun, central in the stellar universe, around which the planets, now including the earth, moved in eccentric circular orbits. The diurnal motion of the heavens now became merely the reflection of the earth's daily rotation on its axis. In spite of the simplicity of this view, a century of barren controversy among astronomers, philosophers, and theologians was needed before it gained any great measure of acceptance. Meanwhile, the Dane Tycho Brahe (1546–1601) spent his lifetime making observations which were later used by his pupil Kepler to

prove that the planets moved not in eccentric circles but in ellipses with the sun at one focus. The simplification thus introduced established the heliocentric theory as it is today, but as yet no reason for the motion was known. Astronomy was still concerned with the geometry and not with the mechanics of the solar system.

Up to the time of Tycho, astronomical instruments were mere sighting devices for the accurate measurement of angles. With the invention of the telescope (c. 1609), however, the heavenly bodies could be magnified and the effective light-gathering power of the eye increased many hundredfold. With one of the earliest telescopes Galileo, a contemporary of Kepler, discovered in rapid succession the lunar mountains, the satellites of Jupiter, sunspots, and the phases of Venus. As a result especially of this last discovery, by the time of his death few still accepted the geocentric theory. Continued improvements in the telescope enabled Huygens and Cassini, in the latter part of the 17th century, to explore more thoroughly the planetary satellites. Their observations enabled the theorists to establish the universal truth of Kepler's laws, and to arrive at the scale of the solar system with fair accuracy.

Newton's Law of Gravitation

For nearly half a century after Kepler announced his laws of planetary motion they remained unexplained. Isaac Newton (1642-1727) showed that they were a necessary consequence of a universal law of gravitation, applying equally to falling bodies on the earth, to the moon in her orbit, and to the remotest satellites of the farthest planets. Newton found that every body attracts every other with a force proportional to the product of their masses and varying inversely as the square of their separation. Other factors than mass and distance play no part in the forces which hold the solar system together. Subsequently this theory was taken up by the 18th century group of French mathematicians, including Euler, Lagrange, and Laplace, in whose hands it explained most of the outstanding anomalies and perturbations of the planetary motions.

The late 17th and early 18th centuries produced in England a band of brilliant instrument-makers who perfected the optics and mechanics of the telescope to such an extent that English

astronomy swung away from the mathematical studies of Newton to the observational work of Halley and Bradley. This was carried out largely at Greenwich, where in 1675 the Royal Observatory was founded for perfecting knowledge of star positions and preparing lunar tables so as to aid navigation. Bradley's accurate observations of star-places led to the discovery of aberration and nutation; and they are still of use. The Greenwich tradition in astrometry, continued into the time of Maskelyne with the foundation of the Nautical Almanac, survives healthily still.

Herschel's Improved Telescopes

So far, the stars had merely provided a background against which the planetary motions were observed; and descriptive astronomy was concerned only with the solar system. The improvements made in the reflecting telescope by William Herschel, who between 1782 and 1789 increased its aperture from 12 ins. to 4 ft., made possible the exploration of the universe of stars. He discovered the motion of the sun amongst the stars (*see* Apex) and from his observations of the Milky Way put forward a disk model for the stellar system which is very close to present ideas. His discovery of binary stars extended the sway of gravitation beyond the solar system and made possible the first measurements of stellar masses; and his observations of the nebulae gave the first inkling of "island universes" more distant even than the Milky Way itself.

The solar system was not neglected in the 19th century. Indeed, a new planet, Neptune, was predicted by its gravitational effect, and found close to the predicted spot; the asteroids (*q.v.*) were discovered; and many new satellites were found. But the main activity remained with the sidereal universe. To astrometry the greatest contributor was perhaps Bessel, who first measured the distance of a star, using the trigonometric method employed on a smaller scale in surveying. Later in the century Argelander's great star catalogue, completed in 1862, was only the forerunner of a host of more comprehensive and more accurate catalogues of position, to the making of which there is no end. The application of photography to astrometry (*see* Astrographic Catalogue) soon revolutionised this branch of the subject, as it did many others. In descriptive astronomy the work

of Herschel and his son was carried on by Lord Rosse, whose great 6-ft. reflecting telescope in 1845 first showed the nature of the spiral nebulae; by Schiaparelli, a painstaking observer of planets and comets; and later by Barnard, who investigated the Milky Way by photography.

MODERN ASTRONOMY. The main front of advance in our knowledge of the universe since the middle of the 19th century has been in the field of astrophysics, which differs radically in methods and approach from the old astronomy. Though the older branches of the science still flourish, advance is rather towards increasing precision in existing studies than in fundamentally new directions. Only a few standard star-places are now found by visual means, to form a basic network for the photographic maps now made possible by wide-angle lenses. Stellar distances are measured photographically, the trigonometric method used still being necessary to scale the other more versatile methods of astrophysics. Theoretical astronomy still has hard nuts to crack with such varied subjects as lunar perturbations and stellar statistics; and the discovery in 1930 of a new major planet, Pluto, though it followed a theoretical investigation, was not made entirely as a result of it. Apart from observations of the surfaces of the planets, of binary stars and variable stars, and of meteors, little visual astronomy is now worth while; and is impotent in the study of the more distant parts of the universe.

Results of Astrophysical Research

The modern picture of the universe as consisting of an insignificant heliocentric solar system embedded eccentrically in a discoidal galaxy, itself one of innumerable stellar systems scattered haphazard throughout an unplumbed space, is one the basis of which was indeed suspected as a result of the older studies; but our knowledge of its scale and detailed construction has come almost entirely from astrophysical research. Nevertheless, the position of the newer science will not be secure without continued attention to its purely astronomical foundations, and the work which goes on in the older observatories, though along lines already laid down, is as vital to progress as the more spectacular advances made in astrophysics.

Astrophysics is largely the logical development of descriptive

astronomy. The stars affect our senses in only one way, *i.e.* through the light they send us; and the astrophysicist makes a physical study of starlight—its brightness, its colour, its polarisation, etc. All astronomical phenomena which indicate or depend on the physical conditions existing in the atmospheres or interiors of celestial objects, or in interstellar space, are properly the domain of astrophysics. Some of the objects studied for centuries by astronomers, *e.g.* sunspots, comets, and variable stars, remained largely a mystery whilst direct examination, either by the naked eye or telescopically, by visual means or photographically, was all that could be done; but they are yielding their secrets to an increasing extent when investigated by the methods and apparatus of the physical laboratory.

The physical study of the stars falls naturally into two parts: (1) observational astrophysics, in which the radiation sent to us by the heavenly bodies is measured and analysed; and (2) theoretical astrophysics, in which the results obtained by observation are collated, subjected to mathematical treatment, and extended, aided by physical theory, to unobserved regions such as stellar interiors.

Use of the Spectroscope

Observational astrophysics may be said to have its origin in the middle of the 19th century with the application of the spectroscope (*q.v.*) to celestial studies. The dark lines in the sun's spectrum, missed by Newton but discovered by Fraunhofer, were shown by Kirchhoff in 1861 to correspond exactly to the bright lines in the terrestrial spectra of such substances as iron, hydrogen, and sodium. Modern observations only strengthen the conclusion that cosmic matter is the same as terrestrial matter, and even suggest that the elements occur everywhere in much the same proportions, with certain explicable exceptions. The versatility of the new method of investigation was clearly shown when Huggins found in 1864 that some at least of the nebulae could not be myriads of stars, since they showed the characteristic bright-line spectrum of a glowing gas. In 1868 the element helium was discovered spectroscopically in the sun 25 years before it was detected on the earth. Empirical investigations continued apace until, with the quantum theory of the atom, it became possible to see more

clearly what was involved in the production of absorption and emission spectra. It is now possible to find the origin of celestial spectra unknown in the laboratory: the nebular lines of Huggins were ascribed by Bowen to oxygen in 1927, and the spectrum of the solar corona was attributed by Edlén in 1941 to iron, calcium, and nickel. Few celestial spectra remain unidentified, and the rôle of the spectroscope in celestial chemistry is almost over.

Detection of Binary Stars

But in other directions the instrument is of increasing importance. The Doppler effect (*q.v.*), by which motion of a source of light in the line of sight can be measured, was first verified with the sun's rotation (known independently from direct observation of sunspots) and then applied to the stars. Thus were first measured stellar radial velocities, which together with the proper motions of classical astronomy have proved invaluable in the exploration of the galaxy and later of the "expanding universe." Binary stars, the components of which are too close for visual separation, were detected in 1889 by their orbital Doppler effect, and the study of these spectroscopic binaries is now an important branch of astrophysics. From the continuous spectrum of a star can be found the temperature of the surface layers: the hotter the star, the more intense are the blue rays relative to the red. Accurate colour temperatures of this kind are now known for hundreds of stars, and less accurate means of measuring colour give approximate temperatures for thousands of others. But perhaps the most far-reaching application of the spectroscope has been the development, from 1914 onwards, of methods of estimating the intrinsic brightness of a star from certain delicate features of its spectrum. Comparison of this intrinsic brightness with its apparent brightness gives a direct indication of the distance of the star. These "spectroscopic parallaxes" have in recent years greatly increased the range of accurate measurement of stellar distances.

Parallel to these spectroscopic advances has been the development of photometers for astrophysical use. The visual photometer developed by Pickering in 1887 was the first instrument to make possible accurate measurements, as distinct from mere estimates, of the brightness of the

stars. By the use of this and similar instruments a catalogue of 46,000 star magnitudes was available by 1908. Meanwhile, as a result of Schwarzschild's researches, photographic photometry was developing. By measuring the diameter or the optical density of star images on photographic plates their apparent brightnesses can be obtained, and many catalogues of photographic magnitudes have been published from 1900 onwards. Nor has the work yet more than begun: more and more magnitudes of greater and greater precision are needed to solve one of the most fundamental problems of astronomy, *viz.* the structure of the galaxy.

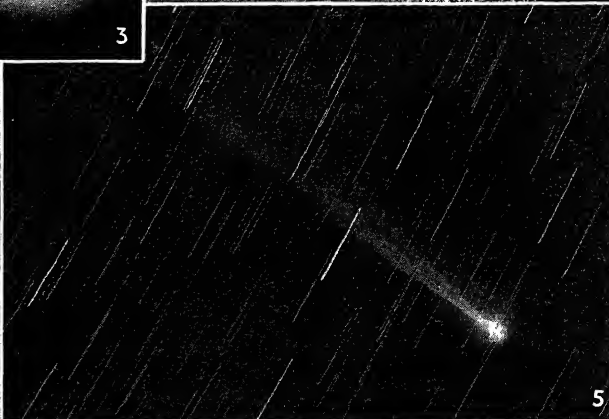
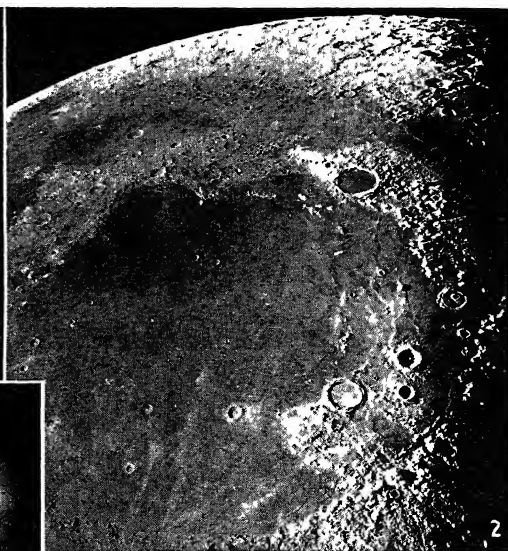
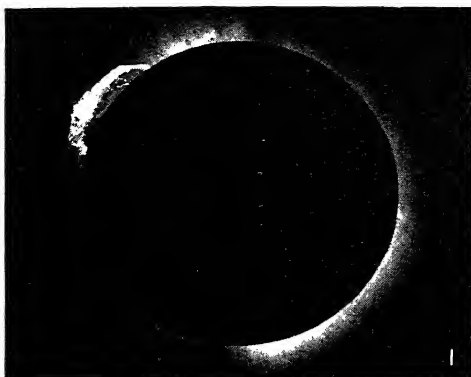
Study of the eclipsing variable stars with photometers (particularly of the photo electric type) has greatly extended our knowledge of stellar diameters and masses. Another class of variable star, the Cepheid variables, are found to vary periodically in brightness at rates which depend upon their intrinsic brightness. Thus a Cepheid variable anywhere in the universe betrays its luminosity and thus its distance by the period of its variation. In this way photometry has given astrophysics its most powerful tool for exploring extragalactic space.

THEORETICAL ASTROPHYSICS.

This is of more recent development than observational astrophysics. It is founded on observational data, and is concerned with most of the fundamental problems of the universe: how the stars and nebulae are distributed in space; how the atmospheres and even the interiors of stars are constituted; and how the universe and its separate units have evolved. Photometry and spectroscopy are the astrophysicist's main weapons in attacking these problems.

Kapteyn's "Model Universe"

The photometric studies of the late 19th century were extended in 1906 by Kapteyn, who proposed and started the exhaustive study of over 250 "selected areas" of the sky as a sample of the whole expanse. From counts of stars of various brightnesses he was led in 1922 to propound a model universe in which the sun was nearly central in a flattened system of stars extending 55,000 light years in the direction of the Milky Way but only 11,000 light years thick at its centre. Analyses of stellar spectra by Oort and Plaskett have proved that the stars in the sun's neighbourhood take part in a general galactic rotation about a



1. Eclipse of the sun, May 29, 1919, as seen at Sobral, Brazil. 2. The moon at the third quarter, showing one of the so-called seas. 3. Jupiter, with its system of belts and zones. 4. Absorbing nebula of the galactic

system in Orion. 5. Comet Finsler, 1937; motion during 5-hour exposure shown by sharp images drawn out into elongated trails. 6. Globular cluster of stars in Centaurus. 7. Spiral nebula, foreshortened view

ASTRONOMY AND ASTROPHYSICS: PHENOMENA SEEN THROUGH THE TELESCOPE

Photos, courtesy of Royal Astronomical Society

distant centre 30,000 light years away. It is now known that Kapteyn was misled by galactic obscuration into assigning the sun a central position when it is in fact quite eccentric in a larger galaxy, 100,000 light years across, probably resembling (from outside) a spiral nebula. Similar nebulae are scattered, apparently at random, in all directions in space, their spectral lines showing shifts which, if they are interpreted as due to line-of-sight motion, mean that the nebulae are receding from us at speeds proportional to their distances. The theoretical explanation of this "expanding universe" is a matter of dispute.

The modern theory of stellar constitution dates back to 1916 and is based on the work of Eddington, who showed that energy is transported from the centre of a star mainly by radiation, which percolates through to the surface, helping gas pressure in supporting the outer layers against gravitational contraction and keeping the interior in a state to which the ordinary gas laws of the physics laboratory are applicable. From these laws probable internal pressures and temperatures can be calculated, and the brightness to be expected from a star of any given mass can be deduced. The mass-brightness relation so found agrees so well with observation that Eddington's basic assumptions are now accepted as correct. By 1938 physics was so far advanced that the probable source of stellar energy had been identified, viz. the transmutation of elements at the temperatures of millions of degrees likely to prevail in stellar interiors. These nuclear reactions (like those occurring in the atomic bomb) give rise to enormous energy outputs by the destruction of mass.

The spectra of stars are determined by surface conditions: the continuous spectrum by the temperature, which is itself controlled by the nature of the absorbing material which obstructs the outflow of radiation and renders the star opaque, though gaseous; the lines mainly by the temperature and secondarily by the pressure at the surface. The observed sequence of stellar spectra is certainly determined by physical conditions, and is almost as certainly an evolutionary sequence. The problem of stellar evolution is, however, by no means solved, and bound up as it is with the origin of stellar energy, itself

a subject which is still very far from being fully understood, presents one of the outstanding challenges to the theoretical astrophysicist. This and the countless other unsolved problems of astronomy and astrophysics will yield only to patient observation, skilful and persistent experiment, and bold analysis by astronomer, physicist, and mathematician.

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Astrophel. Poetic name adopted by Sir Philip Sidney in his sonnet sequence, *Astrophel and Stella* (star-lover and star), addressed to Lady Penelope Devereux. Spenser used it for the title of his elegy on Sidney. See Sidney, Sir Philip.

Astruc, JEAN (1684-1766). French physician and biblical critic. Born at Sauves, Languedoc, March 19, 1684, he was professor of medicine at Montpellier, 1717, and at Paris, 1731. He wrote several medical works of note, including *De Morbis Venereis*, 1736. In 1753 he issued anonymously a book on Genesis which originated modern textual criticism of the Pentateuch. To support the theory that Moses compiled it from earlier writings, he attempted to divide Genesis into two parts, Jehovistic and Elohist. He died in Paris, May 5, 1766.

Astura. Ancient town of Italy. On the coast of Latium, it stands on the Bay of Anzio, 7 m. S.E. of the ancient Antium and modern Anzio (*q.v.*). Its site was once an island but is now a peninsula. It is unhealthy, and both Augustus and Tiberius are said to have contracted here their fatal illnesses. Cicero had a villa here, and remains of other villas can be traced along the coast.

Asturias. District in northern Spain bordering on the Bay of Biscay. At one time a small independent kingdom, and later a province, it is now represented by the province of Oviedo, although the older name is retained in a general sense. Asturias pre-

serves the name of its early inhabitants, the Astures, a tribe subdued but never wholly subjugated by the Romans.

When, early in the 8th century, the Moors completed their conquest of Spain, the few remaining Christians retreated into Asturias, and in that wild and mountainous region maintained their independence. Having chosen a certain Pelayo as their ruler, they defeated the Moors in 718 at the battle of Covadonga. One of his successors, Alfonso I, may fairly be described as king of Asturias. He extended his rule over Galicia and Navarre, and seized some of the Moorish fortresses, and at his death in 759 left a large kingdom. Another Alfonso took up the work of conquest, and in numerous encounters defeated the Moors. His son Garcia transferred his capital in 910 from Oviedo to Leon, and soon the kingdom of Asturias became the kingdom of Leon. Asturias is thus the nucleus of the kingdoms of Christian Spain. The heir to the Spanish throne was given the title of prince of Asturias. In Oct., 1934, there was a serious uprising by extreme Left elements in Asturias, and during the Spanish civil war (1936-39) Asturian miners put up fierce resistance against Gen. Franco's forces at Gijón and Oviedo. See Spain: History.

Asunción. Capital of Paraguay, S. America. It stands on the Paraguay, at the head of navigation for sea-going vessels, and is 645 m. directly N. of Buenos Aires. It has through rly. connexion with Buenos Aires, and communicates with Encarnación, on the Paraná, by the Central Paraguayan Rly. The seat of a bishopric, it has a cathedral, congress buildings, government palace, university, national college, library, school of agriculture, a hospital, and the handsome building of the Bank of Paraguay. It has a wireless station, shipyards, distilleries, foundries, and mills, and trades in maté (*q.v.*), tobacco, sugar, hides, cedar, and fruits. Founded on Assumption (Span. *Asunción*) Day, Aug. 15, 1537, it was bombarded and plundered by the Brazilians in 1869, and subjected to blockade in 1905. Pop. 130,067.

Asunción, LA. Town of Venezuela, capital of the state of Nueva Esparta. It is situated on the E. shore of the island of Margarita, and manufactures straw hats, linen, embroidery, hammocks, and bricks. The harbour and a great part of the town are in ruins.

Asylum (Gr. *a*, not: *sylē*, right of seizing). Place of refuge. Among the ancient Hebrews asylum was afforded in the cities of refuge—three on each side of the Jordan—to those who had committed homicide unawares. In ancient Greece slaves, debtors, criminals, and others sought asylum at temples, altars, sacred groves, and statues of the gods, from which it was sacrilege to drag them. In imperial Rome statues and other representations of the emperors, and also the Roman eagles, were deemed inviolable refuges. In modern times the name has been specially applied to institutions for the care of the unfortunate and afflicted, especially lunatics; but under the Mental Deficiency Act, 1930, these institutions are officially styled mental hospitals (*qv*). See Sanctuary.

Asylum, RIGHT OF. In international law, the right of a sovereign state to harbour refugees from other countries. Mutual extradition treaties exist between states providing for the surrender of criminals fugitive from justice, but the right of granting asylum to political refugees is absolute, bound only by the international obligation on the state receiving the fugitive not to allow him to use his refuge as a place whence to injure the country from which he has fled. See Extradition.

Asymptote (Greek, not falling together). Line continually approached by a curve but never meeting it. A cone can be cut by a plane in such a way that the curve formed by the section of the plane will be an open one: i.e. its branches will never cut the side of the cone again, but will stretch away to infinity. The curve thus described may be either a parabola or a hyperbola. If a hyperbola, the curve may be figured as being formed by the cutting plane, in a double cone or complete cone, so that it forms a double curve with four branches, instead of two, stretching to infinity. Through the origin of this curve two lines

can be drawn which the branches of the curve will continually approach, but can never meet. These are called the asymptotes of the hyperbola. Mathematically the line touches the curve at infinity and is called a tangent at infinity. See Conic Sections.

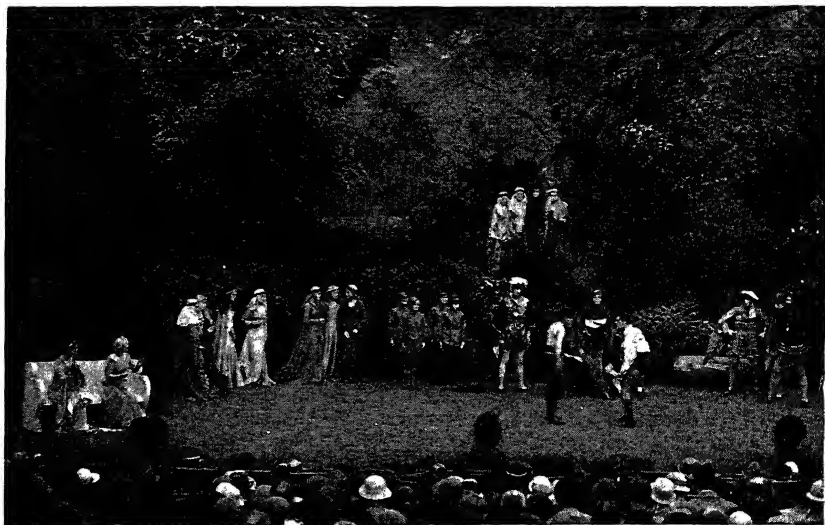
Asyndeton (Greek, not bound together). The omission of the connecting word before the second of two, or the last of a series, of similar words. "The duke of York was a man, big, burly, jolly, cursing, courageous," and Julius Caesar's *Veni, vidi, vici* (I came, I saw, I conquered), are examples. Occasionally effective in giving point by its variation from normal practice, the device may easily become an unpleasing mannerism.

As You Like It. Romantic pastoral comedy by Shakespeare. Rosalind, dismissed from court by her uncle Frederick, the usurping duke, and Orlando, fearing assassination at the hand of his elder brother Oliver, take refuge in the Forest of Arden—Ardenne, geographically, but the Warwickshire woodland as depicted. Here the exiled duke holds his court. Rosalind, dressed as a boy and calling herself Ganymede, teaches Orlando how to woo, without his recognizing her. The usurping duke is converted "from his enterprise and from the world" and retires into a monastery; Orlando and Oliver are reconciled; Rosalind is married to Orlando, Oliver to Celia, Rosalind's cousin and companion; and the exiled duke returns to his dukedom.

Contrast to the love passages is supplied by the melancholic humorist Jaques the courtier, the dry humorist Touchstone the clown, and the phlegmatic humorist Audrey, Touchstone's sweetheart.

Written about 1599–1600, and first printed in the 1623 folio, this five-act play betrays evidence of hasty composition. It is based on Thomas Lodge's *Rosalynde*, a romance of the Ardennes, 1590; but Shakespeare, who is said to have acted the part of the old servitor Adam, introduced the characters of Touchstone, Jaques, and Audrey, and altered the name of Lodge's hero Rosader to Orlando. In it the poet makes a notable quotation (Act. III, sc. 5) from Marlowe's *Hero and Leander*, just published. The play contains 2,904 lines, of which 925 are blank verse and 71 pentametric rhymes. In the part of Rosalind, possibly the most vivacious of Shakespeare's heroines and a favourite part with most actresses, Ada Rehan was outstanding in 1890, and Edith Evans scored a great success in 1937. As Jaques, Oscar Asche excelled.

Atacama. Desert of N. Chile. It comprises the greater part of the provs. of Atacama and Antofagasta, and covers an area of about 70,000 sq. m. It rises from the coast in rocky plateaux, broken by mt. ridges, and attains an elevation of from 7,000 ft. to 13,000 ft. in the Cordillera. Rain seldom falls, except in the E. It is almost devoid of vegetation, and is partly covered with saline,



As You Like It. Shakespeare's comedy finds an appropriate setting in the Open-Air Theatre in Regent's Park, London. The scene shown is the wrestling match in the first act

Photo, J. W. Debenham

nitrate, and borax deposits, dried lake-beds, and shallow ponds. It corresponds in lat. with the Kalahari desert of South Africa and the great Central Desert of Australia.

Atacama. Province of Chile. Bounded N. by Antofagasta and S. by Coquimbo, and extending from the Pacific to the Andes, it has an area of 30,834 sq. m. Hilly and barren, it produces borax, nitrates, salt, copper, iron ore, and silver. Copiapó is the capital. Pop. of prov., 84,312.

Atahualpa (c.1495-1533). Last Inca ruler of Peru. Born probably at Cuzco, he was the son of the Inca sovereign Huayna Capac. Atahualpa, though the elder son and his father's favourite, was illegitimate by Inca law, his mother not being of the Inca royal line. On his father's death in 1525 he received Quito, and his half-brother, Huascar, the rest of the realm. In the spring of 1532, refusing to recognize Huascar as overlord, Atahualpa defeated and captured him and became sole ruler.

In Nov., 1532, the Spaniard Pizarro invited Atahualpa to a friendly interview, and took him prisoner. After paying a large ransom, Atahualpa, still in captivity, plotted the murder of Huascar; but his plans were discovered and he was condemned to be burned alive. On his professing Christianity this sentence was commuted to strangulation, and he was garrotted Aug. 29, 1533.

Atakpamé. Town of Togoland. On the rly. to Blitta, it is 103 m. N. of Lomé, in the centre of a rich agricultural and rubber and cotton-producing district.

Atala. Story by François René Chateaubriand, written during his wandering life and published on his return to France, 1801. It is a tragic romance of a half-Spanish, half-Indian, Christian girl, Atala, and Chactas, an Indian whom she saves from death at the hands of his captors, only to die herself rather than marry against the dictates of her religion. The story established its author's reputation, and is regarded as the starting point of the romantic movement in French literature.

Atalanta. In Greek mythology, the name of an Arcadian maiden. Wishing to avoid marriage, she made it a condition that her suitors should run a race with her. The one who beat her in the race was to have her hand; those whom she overtook she slew with a spear-thrust in the back. At last she was beaten by Milanion, who as he ran dropped three golden apples given

him by Aphrodite. Atalanta, stopping to pick them up, lost the race, and became the wife of Milanion. A similar story, in which the name of the successful suitor is Hippomenes, was current concerning a Boeotian Atalanta. She is said to have accompanied Jason on the Argonautic expedition and to have taken part in the Calydonian boar hunt, an incident which forms the subject of Swinburne's *Atalanta in Calydon*. There is little doubt that Atalanta, like Callisto (*q.v.*), was really a personification of the Arcadian goddess Artemis. See Calydon; Meleager.

Atargatis. A Syrian goddess. This Greek name, often transliterated Derceto, embodies the Aramaic form of Ishtar with the Syrian Ate or the Lydian Attis. Goddess of life-giving water, her chief temples were at Hierapolis, Edessa, and Ashteroth-Karnaim. Mostly represented in human form, as the Philistine Ashkelon she became fish-tailed. Traders carried her worship to Delos and other Mediterranean lands.

Atatürk, MUSTAFA KEMAL (1881-1938). First president of the Turkish Republic. The maker



Kemal Atatürk, 1st President of Turkey

of modern Turkey, he was born at Salonica and entered the army in 1904, identifying himself with the Young Turk movement. In the First Great War he was promoted general and commanded a division defending the Dardanelles. He was given commands in the Caucasus and Palestine and had many disputes with the Germans, resenting their interference with Turkish internal affairs. He was sent to Anatolia in May, 1919, to suppress the nationalist movement, of which instead he became the leader. Outlawed by the Istanbul government, he became a popular hero after the signing of the Treaty of Sèvres (*q.v.*). He was appointed generalissimo in 1921, and drove the Greeks out of Asia Minor, being honoured with the title Ghazi by the national assembly. He concluded the Treaty of Lausanne, and on Nov. 1, 1922, the national assembly abolished the sultanate.

Turkey was declared a republic on Oct. 29, 1923, with Atatürk its first president and chief of state. He embarked at once on a policy

for the modernisation and secularisation of Turkey. On March 31, 1924, the caliphate was abolished and all members of the House of Osman banished from the republic. Atatürk ruled as a dictator and was completely ruthless. In 1925, following the suppression of a rebellion inspired by Muslim clergy, he ordered all religious houses to be closed. The wearing of European hats and clothes was made obligatory; polygamy was abolished, and the wearing of veils by women was banned. A civil code based upon the Swiss model was substituted for the Muslim sacred law, and on April 10, 1928, Mahomedanism ceased to be the state religion. Later in the year the Latin alphabet was substituted for the Arabic script. In 1934 the franchise was granted to women, and the adoption of surnames was made compulsory, the ruler taking that of Atatürk. The reconstruction of Angora as a capital on Western lines was one of his great interests, the city being renamed Ankara (*q.v.*). He married Latîfe Hanım in 1923, but divorced her in 1927 for endeavouring to influence his political missions. He died on Nov. 10, 1938, and was succeeded by İsmet İnönü.

Ataulf (d. 415). King of the Visigoths. He was the brother-in-law of Alaric, whom he succeeded in 410. After assisting Alaric in his invasion of Italy, Ataulf crossed into Gaul. In Jan., 414, he married at Narbonne his captive Placidia, sister of Honorius, emperor of the West, and later went to Spain to quell a revolt of the Vandals and Suevi. He was assassinated by a groom at Barcelona in 415. The name, variously spelt, appears in the latinised form Adolphus. See Visigoths.

Atavism (Lat. *atavus*, father of a great-great-grandfather). Term used in biology. It expresses the occurrence in an organism of some feature or structure not usually present in the existing generation of that species, but suggesting reversion to a type present in some former generations. In the dentition of the horse an extra premolar tooth of this nature occurs. See Biology; Heredity; Life.

Ataxia or **ATAXY** (Gr. *a*, not; *taxis*, order). Medical term for defective coordination of the muscles of movement and balance, or loss of the power of coordinating them. It is a late symptom of the disease locomotor ataxia (*q.v.*).

Atbara. Tributary of the Nile. Rising near Lake Tsana in Abyssinia, it joins the Nile above

Berber, and is the last tributary to enter the Nile before that river reaches the Mediterranean. It contributes fertile silt to Egypt. The summer rains in the highlands of Abyssinia, carried away by the Atbara, Blue Nile, and Sobat, cause the annual Nile flood. For nine months the bed of the river is little but a dry watercourse.

Athara. Town in the Anglo-Egyptian Sudan. It is a junction on the rly. from Wadi Halfa to Khartoum with the Nile-Red Sealy. to Port Sudan, and is 388 m. S.E. of Wadi Halfa.

Atbara, BATTLE OF THE. Fought April 8, 1898, between the British under Sir Herbert (afterwards Earl) Kitchener and the followers of the Mahdi under Mahmud. Kitchener's army had advanced from Berber along the right bank of the Nile and then along that of the Atbara, meeting only minor attacks by the dervish horsemen; but on the 5th it was evident that the enemy was preparing to fight. The Anglo-Egyptian army moved from Abatar to Umdabia, and on the evening of the 7th was in order of battle. The dervishes were encamped in a zareba built amid the scrub on the banks of the Atbara, about seven miles away.

The force, consisting of four brigades of infantry, one British under General Gatacre, and three Egyptian, with cavalry and artillery, arrived in front of the zareba just before dawn on the 8th. Three brigades formed up for the attack. They were in the form of a great bow, the British on the left and the Egyptians in the centre and on the right. At 7.40 the infantry advanced, coming under fire when within 300 yards of their objective. According to plan the leading battalion, the Cameron Highlanders, tore gaps in the zareba, and the whole force then pressed through the trenches and stockade within it. There was a sharp fight therein, for the dervishes fought bravely, but in a short time many of them were killed and the remnant driven to the river. By 8.30 the fight was over and Mahmud a prisoner. The cavalry crossed the river, but the pursuit was not pressed. The losses of the Anglo-Egyptians were 34 officers and 525 men, out of about 12,000 engaged. *Consult* With Kitchener to Khartoum, G. W. Steevens, 1898; The River War, Winston S. Churchill, 1899.

Atchafalaya. River of Louisiana, U.S.A. Rising near the junction of the Red river with the Mississippi, it flows S. through

Grand Lake into the Gulf of Mexico at Atchafalaya Bay. Most of its 224 m. are navigable. It is probable that the river was once the outlet of the Red river.

Atchison. City of Kansas, U.S.A. It stands on the Missouri, 50 m. N.W. of Kansas City by rly. A rly. and commercial centre, it ships grain, lumber, and livestock, manufactures furniture and wagons, and has flour-mills and iron-foundries. It has a county court house, a government building, and a public library. It was named after D. R. Atchison, who settled here in 1854. Pop. 12,648.

Atē (Gr., infatuation). In Greek mythology, daughter of Zeus, or of Eris (strife). The goddess of mischief, Atē figures in Greek tragedy as the power who lures the guilty to further deeds of evil until they compass their own doom.

Atebrin. Synthetic acridine derivative used as an alternative to quinine in the treatment of malaria. It relieves the condition by killing the malarial parasite in the asexual stage of its life-cycle. It is relatively non-toxic to man, but intolerance may arise and be manifest as gastric pain, loss of appetite, and headache: mental disturbances may occur; and the patient may show pigmentation not due to jaundice. The substance was of extreme importance in the Second Great War, when quinine was almost unobtainable. It was known to the British forces as mepacrine.

Atef. Symbolic crown or head-gear worn by ancient Egyptian gods. It consists of a tall white cap with a plume at each side, and bearing the solar disk and uraeus, or serpent emblem.

Ateliers Nationaux. French national works or workshops, especially those set up in Paris in 1848. In Feb. of that year the provisional government guaranteed work and subsistence to all, starting experimental works in Paris and in the neighbourhood. As the employment available proved quite insufficient for the numerous applicants, it was decided to pay those for whom no work could be found 1.50 fr. a day, those who worked receiving 2 fr., irrespective of their qualifications or the amount of work done. Many found it possible to draw the allowance for unemployment and carry on their usual occupation.

The scheme was reorganized by Émile Thomas, who reduced the pay of the unemployed to 1 fr. a day, and arranged the employed in companies of about 900 each,

subdivided into smaller groups, the intention being to put them to useful work in squads. The number of unemployed continued to increase, until there were more than 115,000 names on the roll, while many of those employed did as little as possible. In May the new National Assembly dismissed all single men under 25 years old who refused to join the army, all who refused offers of private employment and all who had been in Paris for less than six months. These and other changes led to the insurrection of June, 1848, and the system collapsed.

These ateliers must be distinguished from the *ateliers de charité*, societies formed to assist destitute workmen; and from the *ateliers sociaux*, productive societies established by Louis Blanc, who was also largely responsible for the idea of the *ateliers nationaux*.

Atella. Town in ancient Campania, Italy, between Capua and Neapolis. It was the birthplace of the popular farces called *Atellanæ fabulae* (Atellan plays), which subsequently enjoyed great vogue at Rome down to imperial times. They dealt with scenes from the country life of the lower classes. Their standing characters were *macrus*, the buffoon, *bucco*, the garrulous toady, *pappus*, the avaricious old man or pantaloon, and *dossennus*, the humpbacked sharper and cutpurse.

Ateshga or **ATECH-GAH.** Locality of Russia, in Azerbaijan S.S.R. It is in the centre of the peninsula of Apsheron on the Caspian Sea, 15 m. N.E. of Baku. The fire-worshippers have their principal temple here. A naphtha spring feeds the sacred flame.

Atessa. Town of Italy, in Chieti prov. It stands on the E. slopes of the Apennines, 25 m. S.S.E. of Chieti, and is noted for its sausages, known as salami.

Ath or **AATH.** Town of Belgium, in Hainaut prov. Formerly fortified, it stands on the canalised Dender, 32 m. by rly. S.W. of Brussels. The Tour du Burbant dates from the 12th century. During the First Great War it was the scene of the last fighting in the west, Nov. 11, 1918. Pop. 10,186.

Athabaska. Lake of Canada, in Alberta and Saskatchewan. Situated in lat. 59° N., long. 106° W., it is 195 m. long, from 5 m. to 35 m. wide, and has an area of 2,842 sq. m. Its outlet to the N. is by the Slave river, and it is navigable by light-draught steamers. There are trading stations on its shores, which are rocky

and infertile. It was discovered in 1771 by Samuel Hearne, who called it the Lake of the Hills.

Athabaska or **ELK**. River of Canada. Rising near Mt. Brown in the Rocky Mts., it issues from a small lake and follows a N.E. direction before curving sharply E. above Athabaska Landing, after receiving the waters of the Little Slave Lake. Thence it turns N. and enters the S.W. end of Lake Athabaska after a course estimated at 776 m. Navigation begins just above Athabaska Landing for stern-wheel steamers, but is interrupted by the Grand Rapids, between which and McMurray the river makes a descent of 355 ft. in 85 m. From McMurray steamer navigation is continuous downstream.

Athabaska. Former district of the North-West Territories of Canada. It was bounded N. by the former district of Mackenzie, S. by Alberta and Saskatchewan, E. by the former district of Keewatin, and W. by British Columbia. Under the Dominion Act of 1905 the W. part was merged into the new prov. of Alberta, and the E. part, with the exception of a strip on the extreme E., was united with the district of Saskatchewan to form part of the new prov. of that name. The remainder was absorbed into the newly constituted North-West Territories, and was acquired in 1912 by Manitoba. The district is a portion of the great American Plain, rising towards the S.W., and is watered by Athabaska, Peace, Reindeer, and other rivers and the Athabaska, Reindeer, and other lakes. It had an area of 251,300 sq. m. See Manitoba.

Athabaska Pass. Depression in the Canadian Rocky Mts. It is between Mts. Brown and Hooker, and crosses from Alberta into British Columbia. It is 10,505 ft. high. See Rocky Mountains.

Athaliah. Daughter of Ahab and wife of Jehoram, king of Judah (2 Kings 8). A worshipper of the Phœnician Baal, after the assassination of her son and Jehoram's successor, Ahaziah, she seized the throne and had all the royal children killed except Joash, who was rescued by his nurse. After she had reigned six years, the high priest Jehoiada arranged with the officers of the army to have Joash suddenly proclaimed king and crowned. When Athaliah appeared on the scene she was seized and slain (2 Kings 11; 2 Chron. 22-23). Racine wrote a tragedy, *Athaliah*, 1690; and there are operas, both entitled *Athaliah*, by Handel, 1733, and Mendelssohn, 1844.

Athamas. In Greek mythology, king of Orchomenus, in Boeotia. Husband of Nephelê, the cloud-goddess, he deserted her for Ino, daughter of Cadmus, by whom he had two children, Learchus and Melicertes. Nephelê complained to the gods, and Athamas, driven mad by Hera, killed his son Learchus. Ino and Melicertes, who threw themselves into the sea to escape from his mad fury, were changed into marine deities.

Atharic (d. 381). Ruler of the Visigoths. After three campaigns against the East Roman emperor Valens, he was compelled in 369 to sue for peace, the negotiations between the emperor and the Goth taking place on a barge on the Danube. In 376 Atharic was defeated by the Huns and took refuge at the court of the emperor Theodosius I. He died at Constantinople in 381.

Athanasian Creed. Statement of the Christian faith, containing a short exposition of the doctrines of the Trinity and the Incarnation. It is one of the three creeds of Western Christendom, and in the Church of England is ordered to be recited at Morning Prayer in place of the Apostles' Creed on Trinity Sunday and on twelve festivals during the year. In the Roman Catholic Church it is said at Prime every Sunday, and in the old Sarum rite it was said daily at Prime.

Its authorship remains problematical. The influence of S. Athanasius is seen in its wording, and while no allusion to either the authorship or existence of the creed is found before the 6th century, critical opinion inclines to the 4th century as the date of its composition. Known sometimes by its opening words, *Quicumque vult*—Whoso wills or wishes—its so-called "damnable" clauses have provoked considerable criticism in the Church of England. These clauses declare that whoso wills to believe the truths held by the Christian Church to be necessary to salvation must hold these truths as defined by the Church, and that the wilful and culpable rejection of these truths entails eternal punishment. See Christianity; Church; Creeds; consult also The Athanasian Creed, A. E. Burn, 1896. History of the Creeds F. J. Badcock 2nd ed., 1938.

Athanasius (c. 297-373). Saint and doctor of the Church. Born at Alexandria, he was present as a deacon at the Council of Nicaea, 325, and was made bishop of Alexandria the same year. For his refusal to recall Arius from exile in 330 he was banished by the Emperor Constantine in 336, but on the deaths of Arius and Con-

stantine he was allowed to return. The Arian party drove him out of Alexandria again in 340, and after appealing to Rome and to the bishops of Gaul he was again restored in 346. For 10 years he laboured in his diocese, and then by the decree of the Arian majority in the Council of Milan, 355, he was once more banished. From 356-362 he withdrew to the desert, to be restored in 363, exiled and finally restored in 364. His last nine years were spent in Alexandria, where he died May 2, 373—the date of his festival. It is due more to Athanasius than any other man that the faith as defined at Nicaea prevailed in the Church. The saying, *Athanasius contra mundum*, Athanasius against the world, passed into a proverb, so considerable was the Arian majority against whom he contended. See Arianism; Arius; consult also Select Writings and Letters of S. Athanasius, A. Robertson, 1892.

Athapascans (Cree, reeds-here-and-there). Tribe of N. American Indians in N.W. Canada. Living around Lake Athabaska, and related to the Chipewyans, they give their name to a linguistic family formerly extending from the Arctic coast to Mexico. Broader-headed than the Algonquins, they may have followed that people from Asia, driving them out of the western tundras. The N. division are hunters and fishers and number about 3,000 in Alaska and 12,000 in Canada. The agricultural S. division inhabit Arizona, New Mexico, and Oklahoma. See American Indians.

Atheism (Gr. *a*, not; *theos*, God). System of thought opposed to theism or belief in God. The term has been applied in an accusatory sense to the denial of current beliefs on divinity—e.g. to Socrates by his accusers, and to the early Christians by the supporters of Roman mythology. Atheism is not the declining to assert an affirmative belief in theism, but is the assertion of the negative to theism. It may take the form of asserting the exclusion of a First Cause, or of asserting the non-existence of a Personal God. Moral atheism is expressed in the assertion that no spiritual First Cause exists, that if God exists man never has learnt and never can learn His will, and that, as no divine sanction can be found for morals, right or wrong in conduct are determined solely by circumstances.

While atheism must not be confounded with materialism, pantheism, or agnosticism, all philosophy that omits the existence of God from its consideration may

be defined as a negative atheism. No philosophic system of positive atheism can be said to exist, but Giordano Bruno (1548-1600), Holbach in the 18th, and Buchner and Haeckel in the 19th centuries, are near such a system. Atheism was inaccurately ascribed to the deism of Voltaire and Rousseau, and to the theism of Thomas Paine. Huxley, Darwin, and Spencer, again, never asserted the non-existence of God, but declared the Absolute to be unknowable. Charles Bradlaugh in England and Ingersoll in the U.S.A. were more concerned with asserting the non-existence of divine revelation than of a First Cause. See Christianity. Deism; Freethought.

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Atheling (A.S., of noble birth). The root of the word appears in the names of some early kings, e.g. Ethelbert and Ethelred. Before the 8th century atheling was used of anyone of noble birth, later only for members of the royal family.

Athelney OR **ATHELNEY ISLE**. Tract of land in Somerset, England. It is situated within the angle formed by the confluence of the Tone and Parret rivers. After his defeat by the Danes in 878-9 King Alfred took refuge here, and fortified the place against attack. In gratitude for the asylum, he later founded a Benedictine monastery on the site. In 1693 excavation brought to light the famous Alfred Jewel (q.v.).

Athelstan (c. 895-940). Anglo-Saxon king, the first to be called King of the English. The son of Edward the Elder and grandson of Alfred the Great, he was crowned at Kingston, Surrey, in 925. In 937 he overthrew all his rivals at Brunanburh, probably in Northumbria. He died at Gloucester, Oct. 27, 940, and was buried in Malmesbury Abbey.

Athena. Major deity of ancient Greece. Also called Athene, Pallas Athene, or Pallas, she was identified by the Romans with Minerva. A daughter of Zeus, she is represented as having sprung fully armed from the head of her father. Pre-eminently the goddess of wisdom, she was also the goddess of war, regarded as a matter of strategy and tactics, not, like Ares (Mars), the deity of blood and slaughter. Athena was also patron of the useful arts, and was asso-



Athena. "The Mourning Athena," a 5th century B.C. Greek memorial to fallen soldiers

ciated with Athens as its special protectress.

A magnificent temple, the Parthenon, was erected in her honour on the Acropolis, and according to Aeschylus the court of Areopagus, on the Hill of Ares, was instituted by her. In the Trojan war, Athena espoused the cause of the Greeks, and Achilles, Odysseus, and Diomedes were under her special protection. She was always regarded as Parthenos, or the maiden-goddess, and in art she is represented as of a somewhat masculine appearance, wearing a helmet and shield. There were three famous statues of Athena by Pheidias, the best known being the colossal Athena Promachos on the Acropolis. See Minerva; Mythology.

Athenaeum (Gr., temple of Athena). Name given in classical times to schools of science and art. Such institutions existed at Athens, Alexandria, Rome, and elsewhere, one of the most famous being that founded by the emperor Hadrian at Rome (A.D. 135). At first much used for the recitation of their productions by poets and rhetoricians, they developed into something like the modern teaching university, with a system of lectures and salaried professors. Athenaeum is the name of various learned societies, and of schools in France, Belgium, and Holland ranking next to universities.

Athenaeum. London club. It was founded in 1824, and its house at the corner of Pall Mall

and Waterloo Place was built soon afterwards, the frieze of the building being a copy of that of the Parthenon at Athens. Persons eminent in public life, science, literature, and art are eligible for membership, and the committee may elect nine persons of eminent attainments every year. There are about 1,700 members, who pay an entrance fee of 40 guineas and an annual subscription of 18. The club contains a fine library.

Athenaeus (c. A.D. 195). Greek grammarian and rhetorician. Born at Naucratis in Egypt, he spent most of his life at Alexandria and Rome. His *Deipnosophists* (Doctors at Dinner) is a miscellany in fifteen books, of which much has been lost. It is a mine of information on ancient life and thought.

Athenia. British steamship, of the Donaldson line (13,581 tons). The first U-boat victim of the Second Great War, she was attacked at 7.45 p.m. on Sept. 3, 1939, when about 250 m. N.W. of the Irish coast on her outward voyage to the U.S. The passengers were at dinner when a torpedo struck the ship. The U-boat then came to the surface and fired a shell which was aimed apparently at the wireless aerial and exploded on the middle deck. On board the Athenia were 1,418 passengers and crew (including about 300 Americans). Of this number 128 remained unaccounted for by the rescue ships.

The U-boat captain, Lemp, claimed to have mistaken the Athenia for an armed merchant cruiser. The German Admiralty falsified the U-boat's log; and German propaganda, denying that any U-boat had been concerned, sought to put the responsibility on Churchill, then British first lord of the Admiralty.



Athenaeum. Façade of the London club, showing its classical design

ATHENS: IN ANCIENT AND MODERN TIMES

E. A. Gardner, Litt.D., and Henry Baerlein

The important part taken by Athens in history is here outlined and some account given of its wonderful buildings. Reference should be made to the article Greece and to those on Pericles, Socrates, and other great Athenians. See also colour plate, facing p. 1, and illus. p. 74

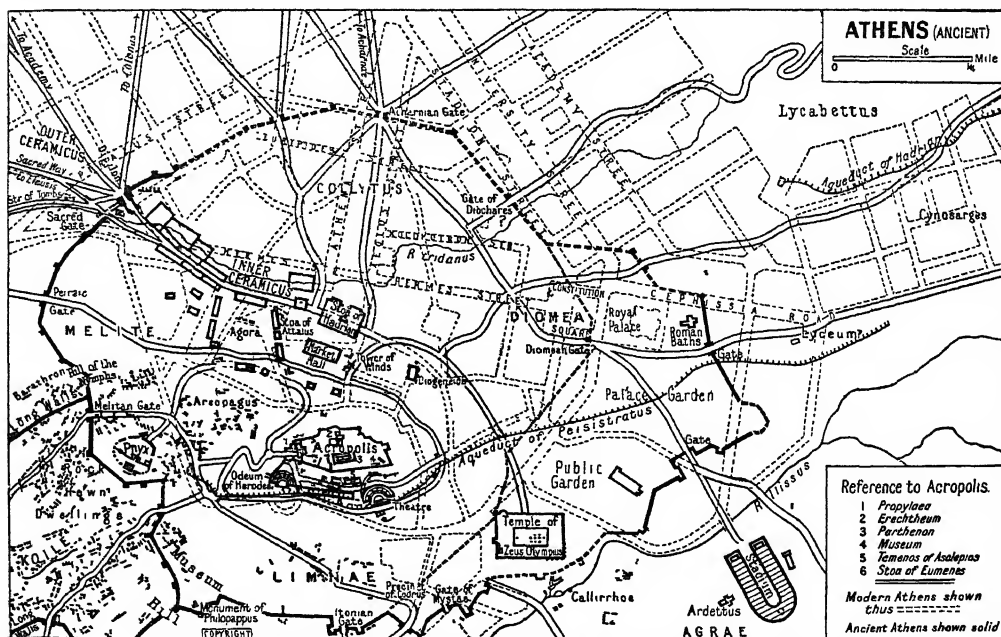
Athens, in ancient times the most famous of Hellenic cities, and now the capital of the Greek kingdom, is situated in Attica on and around a group of hills, about three miles from the coast and four from its harbour town, the Peiraeus. Such a position was a common one for ancient Greek towns, since it conferred the advantage of easy communications by sea, while it was not liable to sudden attack by pirates or other enemies. The hills of Athens are at the south-western end of a range which divides the Attic plain, the two rivers, the Cephissus and Ilissus, running on each side of the range and meeting below the town. The plain, which forms the immediate territory of Athens, is bounded on the N.E. by Mt. Pentelicus, on the S.E. by Mt. Hymettus, and on the N.W. by Mt. Aegaleus, with Mt. Parnes farther away to the N.

The other main divisions of Attica are the Thriasian plain, stretching away westward to Eleusis beyond Aegaleus, the plain of Mesogaea, beyond Hymettus to the E., and the district of Marathon beyond Pentelicus.

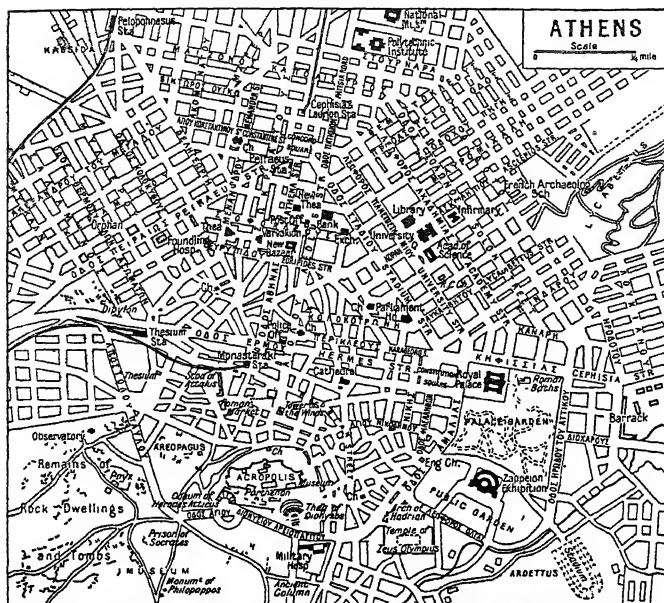
The synoecism or concentration of the scattered population of Attica in the town of Athens was attributed by tradition to Theseus. The earliest town consisted, according to Thucydides, of the Acropolis and its immediate surroundings. The Acropolis itself was a fortress, similar to those of Mycenae and Tiryns, containing the palace of the king, and its massive walls of Cyclopean masonry are still preserved in many places. It was also the chief religious centre, and contained the most sacred objects, the olive tree of Athena and the salt spring of Poseidon, which were said to have been produced by these two deities as tokens in their contest for the guardianship of the land. The old temple of Athena as goddess of her chosen city stood on the site of the palace of the early kings; the date of its building is unknown, but may well be associated with the abolition of the kingship, traditionally c. 1060 B.C. The tyrant Peisistratus (560-528 B.C.) did much to improve and beautify the city. He added a peristyle to the old temple of Athena, and began the huge temple of Zeus Olympius, not completed until

Roman times; he also made an aqueduct to supply the town with water, and decorated the famous fountain of Callirrhoe with an architectural façade, after which it was called Enneacrounos (the Nine Spouts). After the expulsion of the tyrants the Acropolis was no longer maintained as a fortress, but a new and much larger temple of Athena was begun on the site later to be occupied by the Parthenon, and the massive substructure was built which still carries the later temple.

At the time of the Persian invasion in 480 B.C. the town was indefensible, and the entrance of the Acropolis had to be blocked by a wooden palisade. The Persians sacked both town and Acropolis, burnt the half-finished temples, and broke or threw down the statues and other offerings. The Athenians, on their return, built the remains of these older structures and offerings into their new walls, or used them to fill in the terrace of the Acropolis, thereby preserving a valuable record of their early art. The wall of the town, thus hurriedly constructed, was extended on all sides. That of the Acropolis on the N. side was similarly rebuilt; the great walls of the Acropolis on the E. and S. were more regularly constructed at a later date, when Cimon brought home the spoils of his victory over the Persians at the Eurymedon (c. 466 B.C.), and the hill then assumed the regular shape which



Athens. Plan of the ancient city superimposed upon a slightly defined plan of the modern one



Athens. Ground plan showing the modern town with the academy, library, university, national museum and archaeological schools side by side with ancient temples and ruins

has ever since distinguished it. To the time of Cimon must probably be assigned many famous buildings round the Agora (market place) in the lower town, including the Stoa Basileios (royal portico) and the Stoa Poikilē (painted portico), which contained the famous paintings of the battle of Marathon and other mythical and historical combats, by Polygnotus and his pupils. Cimon also brought the bones of Theseus to Athens from Scyros and built the Theseum—not, however, in all probability, the temple now known by that name—for their reception.

It was not until shortly before the Persian invasion that the Athenians became the chief sea power of Greece, and consequently turned their attention to their port, its defences, and its communications with the city. Before that time they had been content with the open roadstead of Phalerum. It was one of the great achievements of Themistocles that he made them realize the value of the Peiraeus, with its defensible hills and its three natural harbours. After the Persian defeat he persuaded them to adopt the policy, carried on by Cimon and Pericles, of building and fortifying the harbour town, and connecting it with Athens by the "Long Walls," which made the city well-nigh unassailable by land, so long as Athens kept control of the sea. Themistocles even went so far as to advocate the transference of the

city itself to the Piraeus, in case of enemy pressure

The age of Pericles was the time of the highest artistic activity in Athens, when the Acropolis was decorated with the most typical examples of Greek architecture and sculpture. The earliest of these (about 450 B.C.) was the little temple of Athena Nikē (sometimes called Wingless Victory), which stood on the bastion S. of the entrance; then came the Parthenon, built between 447 and 433 B.C.; and after this the great columned gate-house or Propylaea, begun in 437 B.C. The general

control of all the work under Pericles was assigned to the sculptor Pheidias, who executed the colossal gold and ivory statue of Athena Parthenos within the Parthenon. At an earlier date he had made the great bronze statue of the goddess set up in the open on the Acropolis and forming a conspicuous landmark from the sea.

During the Peloponnesian War the population of Attica was crowded within the city and the Long Walls, and artistic activity was curtailed. But the Erechtheum, the graceful Ionic temple which enshrined the most sacred objects on the Acropolis, must have been begun in an interval of the war—probably after the Peace of Nicias in 421 B.C. It was still unfinished, as is proved by inscriptions, in 409 B.C.; with its completion, then undertaken, the buildings on the Acropolis, except for insignificant additions, took the form which they preserved to the end of the classical era.

By the terms of the peace concluded with the Spartans at the close (404) of the Peloponnesian War, Athens undertook to give up all her colonial possessions, to hand over all her ships except twelve, to support the Spartans in war and peace, and to pull down the Long Walls. These, however, were restored by Conon after his victory at Cnidus in 394 B.C. had restored Athens to something like her former position. There were many fine public buildings erected in Athens during the 4th century B.C., especially under the administration of Lycurgus. He completed the Dionysiac Theatre, in something like its present form, the Stadium, and the gymnasium known as the Lyceum.



Athens. Constitution Square, centre of the social life of the city, lying directly in front of the royal palace



1. Ruins of the second Erechtheum, an Ionic temple, containing altars to Poseidon, Erechtheus, and Hephaestus
2. Monument set up in 334 B.C. to commemorate the victory of Lysicrates when choragus (leader of the chorus)

in a musical contest. 3 Temple of Wingless Victory on the Acropolis 4. Corinthian columns of the Temple of Olympian Zeus, rebuilt by Antiochus IV. 5. Part of Hall of Carya on S. side of Erechtheum, supported by Caryatides

ATHENS: NOTABLE REMAINS OF SOME OF THE TEMPLES FOR WHICH THE CITY WAS FAMOUS

At this time, probably, many fine public gardens were laid out, notably the Academy. There were also many beautiful private monuments, of which the circular choragic monument of Lysicrates, dedicated in 334 B.C., survives

To the 4th century also belongs the beautiful series of Attic tomb-reliefs, which are still to be seen in the Ceramicus and elsewhere. In the Hellenistic age Athens, though her political importance was diminished, had come to be regarded as the literary and artistic metropolis of the world; and consequently the Greek kings who ruled as the successors of Alexander's empire vied with one another in adorning Athens with splendid buildings. Conspicuous among these were the Stoa (porticoes) of Attalus and Eumenes of Pergamum, still visible in the more solid parts of their structure, and the Gymnasium of Ptolemy. But above all Antiochus IV Epiphanes of Syria undertook the rebuilding of the great temple of Zeus Olympius, begun by Peisistratus, and completed in the

time of the Emperor Hadrian. The enormous Corinthian columns still to be seen in the precinct S.E. of the Acropolis probably date from the period of Antiochus.

The Roman age has also left its monuments in Athens. Among these are the octagonal Tower of the Winds in the Roman market place, built by Andronicus of Cirrhus in Syria, and described by Vitruvius; and a market hall, with a Doric portico of entrance, dedicated to Athena Archegetis in the time of Augustus. A small round temple to Rome and Augustus was built on the Acropolis in front of the Parthenon. The Odeum of Pericles, which had been burnt when the town was captured by Sulla, was rebuilt by King Ariobarzanes of Cappadocia. A still conspicuous monument is that set up A.D. 114-6, on the top of the Museum Hill, by Philopappus, to commemorate his ancestors of the dynasty of Comagenē. But the chief age of imperial activity in Athens was the reign of Hadrian (A.D. 117-

138); he completed the great temple of Zeus Olympius, and built round it a new quarter of the city, separated from the old by an arch with a grandiloquent inscription, stating that one side is the city of Theseus, the other that of Hadrian. He also built a great library. To his time also belongs the rhetorician Herodes Atticus, who rivalled the emperor in the magnificence of the public buildings erected or decorated by him—notably the Stadium, which he supplied with marble seats (since carried off, but renewed by a modern benefactor for the Olympic games of 1908), and the small theatre known as the Odeum of Herodes, still almost completely preserved. The visit of S. Paul to Athens is especially associated with the Areopagus (Hill of Arēs, or Mars' Hill), a natural mass of rock facing the Acropolis, famous in ancient times for its court.

The buildings of Athens remained practically unchanged until the 5th or 6th century A.D., when the old religion was officially

abolished, and the statues of the gods removed. The chief temples, including the Parthenon, the Theseum, and the Erechtheum, were converted into churches, and so survived with some alterations in their structure and some damage to their sculpture. In the time of the Frankish dukes of Athens (1204-1456) the Propylaea were used as their palace, and the tower was built which may be seen in views of Athens previous to 1874, when it was removed. The walls of the old city had long been dismantled, and a new and much smaller circuit was constructed to defend the Acropolis and the district immediately to the N.

After the capture of Athens by the Turks in 1456, the Parthenon became a mosque, and a minaret was built at its western end. In 1687 the Venetians bombarded the Acropolis, and exploded the powder magazine which had been placed in the Parthenon by the Turks, destroying all the central part of the temple. From this time onwards the monuments of Athens were in constant danger of damage or destruction, and many portions of their sculpture were carried off piecemeal. In 1801 Lord Elgin obtained a *firman* permitting him to remove sculpture from ancient buildings in Athens and to take it to England; the Elgin Marbles were deposited in the British Museum in 1816. His action met with adverse criticism from Lord Byron and others; but it not only made the Athenian sculptures known to a wider circle, but also preserved them from the dangers to which they were exposed in Athens, especially during the Greek War of Independence, when the Acropolis was twice bombarded.

Capital of the New Kingdom

Up to this time Athens was but a small provincial town; Shelley's prediction, "Another Athens shall arise," was hardly to be taken in its literal sense. But in 1834 Athens was made the capital of the new kingdom of Greece, and soon began to take a form worthy of her restored dignity. Fortunately the new quarters were built mostly to the N. and E. of the Acropolis, leaving the most characteristic monuments of ancient Athens open towards the sea. The Acropolis and its immediate surroundings have been cleared of medieval or Turkish remains; and systematic excavations, especially dating from the end of the 19th century, have revealed all that could be recovered from

primitive or classical times. Several of the ancient buildings have been restored as far as was possible from extant remains.

E. A. Gardner

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The modern town has been laid out on a systematic plan, the Hermes street running from the Old Palace to the N. of the Theseum, and the Athena and Aeolus streets intersecting it at right angles, running N. from the Acropolis; fine broad streets run to join these diagonally—especially the Stadium and University streets, which contain the finest modern buildings. Chief among these are the academy, the public library, the university, the polytechnic, and the national museum, all built of white marble in the classical style. Athens has also become a centre of international archaeological study, by the foundation of the French, German, American, British, and Italian schools. It is the see of the archbishop of Athens, who is head of the Autocephalous Church of Greece, and the financial centre of the country. Since 1922 a considerable industry has sprung up in the environs of Athens and at the Piraeus, which has grown to be one of the chief ports in the Mediterranean. Railways extend W. to the Piraeus and the Peloponnese, S.E. to Laurium, and N. to Salonica and central Europe. Pop. 487,045.

Between 1923 and 1930 there was built round the city a belt of refugee working-class settlements, the refugees being in the main from Turkey. The greatest improvement during this period was the construction of the Marathon Dam by the American Uhlen Company, which provides Athens with an excellent water supply.

From April 28, 1941, the city was administered by the Italian invaders, while its port Piraeus was in the hands of the Germans. (See Greece in the Second Great War.) When Italy capitulated in Sept., 1943, the Germans disarmed their late allies and took over the administration completely. During the entire period of occupation the arresting of hostages and executions

of patriots of every class of society proceeded uninterruptedly; just outside Athens the large concentration camp at Haidari was always full of political prisoners. Both Germans and Italians were extremely severe, but while the Italians did not enforce special measures against the Jews, the Nuremberg laws were at once applied by the Germans when they took over, the Jews, except for those concealed by their fellow-citizens, being usually dispatched to Poland. Every form of sabotage found expression in Athens, telephone wires being cut, industrial plants damaged; and British officers and men who had been left behind when their comrades were evacuated had shelter provided for them, while military information was regularly sent to the Middle East Command in Egypt. No fewer than 60 clandestine newspapers and news-bulletins were published and distributed in Athens. They told the citizens, for instance, of what archbishop Damaskinos was doing in his resistance to the demands of the enemy and of the relief measures organized by him. There was wholesale requisitioning of stocks of food and materials, which resulted in famine.

Aftermath of War

In Oct., 1944, the Germans withdrew, blowing up bridges behind them, and on Oct. 13 a British commando force entered the city, which became a port for Allied troops and for reception of UNRRA supplies.

The exiled Greek govt. returned to the capital Oct. 18. Its task of restoring order was hampered by the hostility between left- and right-wing groups of the resistance movement, between whom sharp fighting broke out in and around Athens during Dec. A visit to the city of the British premier Winston Churchill, who called a conference there of representatives of all parties, failed to effect reconciliation, and British troops had to intervene; they cleared Athens of the fighting groups during the first week of 1945. Civil war did not return to the city.

Unharmed by the Germans, Athens had suffered badly during the fighting of Greek with Greek; owing to the poverty of Greece, and the drain upon her resources of the continuing civil war elsewhere, it was 1948 before the damage to the city began to be repaired. Athens airport at Elleniko was reconstructed at the same time.

Athens. City of Georgia, U.S.A., the co. seat of Clarke co. It stands on the Oconee river, 69 m. N.E. of Atlanta, on the Georgia and other rlys. An important rly. and educational centre, it is the seat of the university of Georgia and of the state college of agriculture, and contains the Lucy Cobb girls' institute, a state normal school, and a public library. It has cotton and woollen, fertiliser, and cottonseed oil manufactures. It was founded in 1785 as the seat of the university (opened 1801), and was chartered as a city in 1872. Pop. 20,650.

Athens. City of Ohio, U.S.A., the co. seat of Athens co. On the Hocking river, 74 m. S.E. of Columbus, it is served by the Toledo and Ohio Central and other rlys. The seat of Ohio university, founded 1804, it has a state mental hospital and a public library. Athens lies in an important coal region and has brick, furniture, shirt, and lumber industries. In the vicinity are several Indian mounds. Settled in 1797, it was incorporated in 1811, and reincorporated 17 years later. Pop. 7,696.

Atherine (Gr. *atherinē*). Genus of small fishes known as sand smelts. They are caught in great numbers off the Devonshire coast, and may be distinguished from true smelts by the spines on the dorsal fin. See Smelt.

Atheroma. Medical name of a degenerative change in the arteries. See Arterio-sclerosis.

Atherstone. Parish and market town of Warwickshire, England. It is on Watling Street, 102 m. N.W. from London, on the railway. In the town is a milestone purporting to be equidistant from London, Liverpool, and Lincoln. The church of S. Mary, of monastic origin, dates from the 12th century. It was rebuilt in 1849, except the tower and chancel. Hat making is the chief industry. Market, Tues. and Sat. Pop. 6,500. The remains of Merevale Abbey are in the vicinity. At Fenny Drayton, 3 m. E., was born George Fox, founder of the Quakers.

Atherton OR CHOWBENT. Urban district and market town of Lancashire, England. It is 5 m. S.W. of Bolton by rly., and has cotton factories, ironworks, and collieries. Market day, Sat. Pop. 19,985.

Atherton, GERTRUDE FRANKLIN (1857-1948). American novelist. Her maiden name was Horn, and Benjamin Franklin was her great-grand-uncle. She was born at San Francisco, Oct. 30, 1857, and made her name with many novels of

Californian life, several of a political or sociological tendency. Alexander Hamilton, some of whose letters she edited (1903), is the hero of *The Conqueror*, 1902; and her other works include *Patience Sparhawk and Her Times*, 1897; *American Wives and English Husbands*, 1898; *Senator North*, 1900; *The Tower of Ivory*, 1910; *The Avalanche*, 1919; *Black Oxen*, 1923; an autobiography, *Adventures of a Novelist*, 1932; *The Horn of Life*, 1942; *Golden Gate Country*, 1945. She died at San Francisco, June 14, 1948.

Athgarh. A former state of Orissa, India, now merged in the prov. Its area was 168 sq. m. on the forested Nagpur plateau, inhabited mostly by primitive tribes.

Athletics (Gr. *athlētēs*, contestant). Art or practice of physical games or exercises. The Olympic Games of the Greeks are traceable to the forms of exercise usual among the Egyptians. Running, leaping, throwing the discus, boxing, and wrestling were popular among the early Greeks and Romans. Among the earliest sports to be organized in the British Isles were the Taitin Games in Ireland, said to be two or three thousand years old; the Highland Games of Braemar, Aboyne, and other places in Scotland; and the various gatherings at Bath, on the Cotswold Hills, and Halgawar Moor, near Bodmin, Cornwall. The Westmorland and Cumberland sports are closely allied to the Highland Games.

Young Londoners in Henry II's time indulged in leaping, wrestling, and casting the stone; and Henry VIII was famed for throwing the hammer, or, as it was then called, casting the bar. During the reign of Elizabeth sports of this kind were more popular among the humbler classes than with the nobility. There was apparently a great vogue for foot-racing in the time of the Stuarts, probably due to the fashion of noblemen keeping running footmen and to the desire to match the speed of their respective servants one against another. Pepys describes a match between one of these footmen and a professional runner in Hyde Park on Aug. 10, 1660.

One of the first athletic meetings properly so called was that convened by Major Mason in 1807, in connexion with an athletic society called the Necton Guild, at Necton, Norfolk. The various events included wrestling, jumping in sacks, foot-races, etc.

Exeter College, Oxford, was the pioneer in instituting annual athletic meetings at that university; the first, held in 1850, comprised two miles cross-country, a quarter-mile flat, 300 yards, 100 yards, 140 yards, and one mile over ten flights of hurdles. Now nearly every public school, university, and institution has its annual athletic meeting. The first athletic meeting at Cambridge university took place March 16-18, 1857; and the annual Inter-University Meeting was inaugurated at Oxford, March 5 1864.

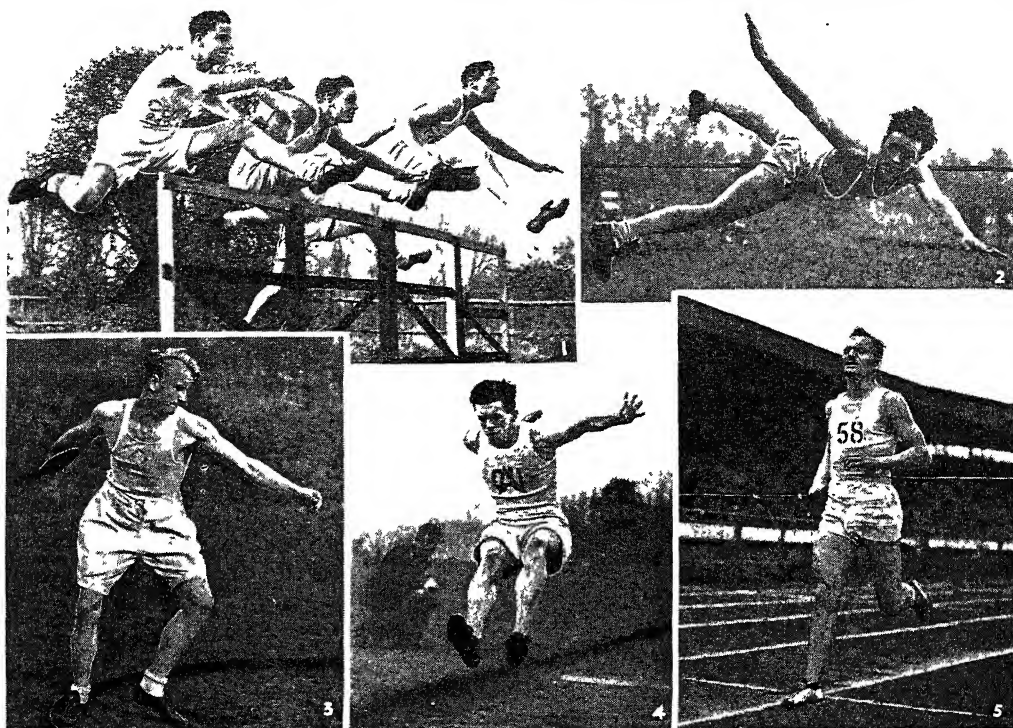
In the United Kingdom one of the principal athletic functions of the year is the Inter-University Meeting at the White City, held before Easter, at which there are 12 events: the 100 yards, quarter-mile, half-mile, one mile, and three miles (running); 120 and 220 yards hurdle races; the high and long jumps; weight, discus, and javelin. Another important fixture is the Amateur Championship Meeting, held on the second or third Saturday in July at the White City, just after the Scottish and Irish Championship Meetings. Eleven of the same events make up the programme with 440 yards hurdles replacing the 120, and with the following added: 220 yards (flat), marathon (q.v.), pole vault, hammer, tug-of-war, and (normally held earlier in the season) ten miles race and seven miles walk.

The principal athletic meetings sponsored by the Amateur Athletic Association (q.v.) are the County Championships, the Amateur Championship meeting, the Mid and Counties and Southern Championships, and the Junior Championships.

British record holders in 1949 included the following:

100 yds.	E. Conwell	9'6s.
	E. McD. Bailey	
220 yds.	W. R. Applegarth	21'2s.
440 yds.	A. S. Wint	47'4s.
880 yds.	S. C. Wooderson 1m.	49'2s.
1 mile	S. C. Wooderson 4m.	6'4s.
3 miles	S. C. Wooderson 13m.	53'2s.
120 yds. hurdles	F. G. Towns (U.S.A.)	14'4s.
40 yds. hurdles	J. Patterson (U.S.A.)	5'3s.
High Jump	A. Patterson	6ft. 7½ins.
Long Jump	W. Steele (U.S.A.)	25 ft 8 ins
Pole Vault	C. Warnerdam (U.S.A.)	14 ft. 3 ins.

In 1896 a great international athletic meeting was held at Athens in the form of the old Olympic Games (q.v.). Similar meetings took place at Paris, 1900. St. Louis, U.S.A., 1904; in England, 1908. in Sweden, 1912; at Antwerp. 1920: at



Athletics. Tense moments in an Inter-University and Allied forces athletic meeting. 1. First jump in the 120 yds high hurdles. 2. Over the bar in the high jump. 3. Throwing the discus. 4. The long jump. 5. Breaking the tape in the 880 yds. race

Paris, 1924; at Amsterdam, 1928; at Los Angeles, 1932; at Berlin, 1936; and in England, 1948. At these gatherings, in addition to the usual athletic events, were included almost every sport and game practised by the competing countries.

Some winners at the Olympic Games, London, 1948:

100 metres	Dillard (U.S.A.) 10'3s.
400 metres	Wint (Jamaica) 46'2s.
800 metres	Whitfield (U.S.A.) 1m. 49'2s.
1,500 metres	Eriksson (Sweden) 3m. 49'8s.
10,000 metres	Zapotek (Czecho-Slovakia) 29 m. 59'6s.
110 metres hurdles	Porter (U.S.A.) 13'9s.
400 metres hurdles	Cochran (U.S.A.) 51'6s.
Marathon	Cabrera (Argentina) 2h. 34m. 51'6s.
4 x 400 metres relay	U.S.A. 41'3s.
Decathlon	Mathias (U.S.A.)
Walking Race (50 km.)	Ljunnggren (Sweden) 4h. 41m. 52s.
High Jump	Winter (Australia) 6ft. 6ins.
Long Jump	Steel (U.S.A.) 25ft. 8ins.
Pole Vault	Smith (U.S.A.) 14ft. 1ins.

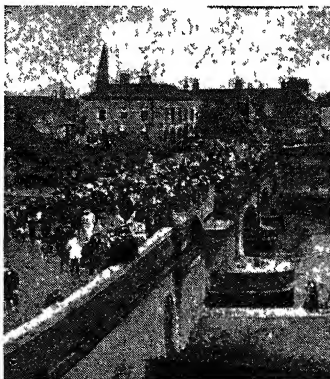
Mrs. F. E. Blankers-Koen (Holland) won the women's 100 metres (11'9s.), 200 metres (24'4s.), and 80 metres hurdles (11'2s.).

A perennial athletic effort is the attempt at a 4-minute mile. On

July 18, 1945, G. Haegg (Sweden) set up a world record of 4 m. 1'2s. See Hurdling; Jumping; Running.

Athlit or **ATLIT**. Town of Palestine. It lies about 10 m. S. of Haifa on the Mediterranean. It figured in the Crusades, and contains the remains of a castle built by the Knights Templars in the 13th century.

Athlone. Urban district and market town of co. Westmeath, Eire. It is 78 m. by rly. W. of Dublin, and is divided by the



Athlone. Bridge over the River Shannon in this Eire market town

Shannon, which river and the Grand and Royal canals enable it to engage in trade with Limerick and Dublin. A fine bridge, opened in 1844, spans the Shannon. Athlone has linen and woollen manufactures, and fishing is engaged in. It has a broadcasting station. The old castle withstood a lengthy siege in 1641 and an attack by William III in 1688, but fell to General Ginkel three years later. Market days, Tues. and Sat. Pop. 7,546.

Athlone, **EARL OF**. British title borne from 1692 to 1844 by the family of Van Reede, and revived in the Royal Family. Godard van Reede, a Dutch general in the service of William III, distinguished himself at the siege of Athlone in 1691, and was created earl of Athlone in 1692. The title was held by his descendants until 1844. From 1890 to 1892 Albert Victor, eldest son of King Edward VII, then prince of Wales, was earl of Athlone; and in 1917 the title was given to Prince Alexander of Teck (b. 1874), brother of Queen Mary. He was governor-general of the Union of S. Africa from 1923 to 1931, and governor-general of Canada, April 3, 1940, until 1946. *Consuli* Life, M. E. Sara, 1941

Athmallik. A former feudatory state of Orissa, India, now merged in Orissa prov. It covered an area of 730 sq. m. on the Chota Nagpur plateau.

Athodyd. Abbreviated form of aero-thermo-dynamic duct, a type of jet propulsion for aircraft. It is also known as a propulsion duct or ram-jet, and differs from most "jet" units in having no turbine, compressor, or other moving parts. The air is compressed solely by forward motion, or ram effect, and even the combustion chamber involves no elaborate engineering. The propulsion unit of the V1 or flying bomb (*q.v.*) was not a true athodyd, being of the intermittent impulse type. The disadvantages of an athodyd are its excessive fuel consumption and inability to provide take-off power unassisted. *See also Jet Propulsion.*

Atholl or **ATHOLE.** District in Perthshire, Scotland. It surrounds Ben Dearg in the Grampians, and has an area of about 450 sq. m. Famed for its deer forests and salmon-fishing, it gives the title of duke to the chief of the Murrays.

Atholl, Duke of. Scottish title borne since 1703 by the family of Stewart-Murray. The first earl of Atholl was Sir John Stewart (15th century). The 4th earl was a prominent supporter of Mary Queen of Scots, until he joined her enemies. His son John, the 5th earl, died in 1595, when the earldom became extinct. John's daughter married William Murray, earl of Tullibardine, but by arrangement their son became earl of Atholl in 1629. He and the 7th earl were royalists during the Civil War. The latter, made a marquess in 1676, took the lead in suppressing Argyll's rebellion in 1685.

His son, the 2nd marquess, adhered to William of Orange in 1688, and in 1703 was made a duke. Afterwards he turned against the Government and was associated with the Jacobites. In 1714, on the accession of George I, he was deprived of his offices, but did not join the rebellion in 1715. Three of his sons did so, and in consequence the dukedom, on his own death in 1724, passed to his second son James, and through his descendants to James Thomas Stewart-Murray (b. 1879), who became the 9th duke in 1942.

The 8th duke (1871-1942), as Lord Tullibardine, was Unionist M.P. for West Perthshire from 1910 until he succeeded to the title in 1917. He served in the Sudan campaign of 1898, and in

the S. African War. During the First Great War he raised mounted troops among his clansmen and served in Gallipoli. He was lord high commissioner to the church of Scotland, 1918-20. He died March 15, 1942.

The 2nd duke inherited, in 1736, the sovereignty of the Isle of Man. In 1765 this sovereignty and certain rights were sold to the British Government for £70,000, and John, the 4th duke, sold the remaining rights for a further £417,000 in 1828. The duke's chief seat is Blair Castle, near Blair Atholl, Perthshire. The eldest son is called the marquess of Tullibardine, and the duke sits in the House of Lords as Earl Strange.

Atholl, KATHARINE MARJORY MURRAY, DUCHESS OF (b. 1874). British politician. The daughter



Duchess of Atholl,
British politician

of Sir James Ramsay of Banff, the historian, she was born Nov. 6, 1874, and in 1899 married the marquess of Tullibardine, afterwards 8th duke of Atholl. From 1924 to 1929 she was parliamentary secretary to the Board of Education, and a British delegate to the Assembly of the League of Nations, 1925. Conservative M.P. for Kinross and W. Perth from 1923, she resigned her seat in 1938 as a protest against the British government's foreign policy in regard to Spain and Italy. An outspoken champion of the Spanish government during the Spanish civil war, she then contested her seat as Independent in Dec., 1938, but was defeated by a small majority. The duchess was trained as a musician at the Royal College of Music, London, and published settings of poems by R. L. Stevenson. Her literary works include *Women and Politics*, 1931; *Conscription of a People*, 1931; *Searchlight on Spain*, 1938.

Athor. Ancient Egyptian goddess, usually called Hathor (*q.v.*).

Athos. Mt. of Greece, famous for its monasteries. It is situated on the Hagion Oros, the E. tongue of the Chalcidice Peninsula, is 6,332 ft. high, and about 80 m. S.E. of Salonica. The majority of the monks are Greek; they engage in farming, fishing, and weaving, in addition to their religious offices. Each of the 20 monasteries is a republic, its head being an abbot

elected for life, or an overseer elected for a term of years. The mt., with most of the peninsula, is administered by a council of four members and an assembly. This virtual autonomy was recognized by the Greek government on Sept. 10, 1926. The isthmus bears visible traces of the canal cut by Xerxes before his invasion of Greece in 480 B.C.

Athos. One of the Three Musketeers in Dumas's romance of that name, and also in Twenty Years After and the Vicomte de Bragelonne. He is a somewhat romantic grand seigneur, whose real name is the Comte de la Fère, and he is the father of Raoul, the Vicomte de Bragelonne. Thackeray wrote of him as his favourite among "heroic heroes." *See Aramis; Porthos.*

Athribis. Grecised name of two ancient Egyptian towns. One, at Kom el-Atrib near Benha in the Delta, yielded XIIIth dynasty sculptures and a lion of Rameses II, now in the British Museum. The other, on the left bank of the Nile below Akhmim, excavated by Petrie in 1908, revealed Old Kingdom tombs and Ptolemaic temples.

Atitlán. Lake in the S. of Guatemala. About 24 m. long by 10 m. broad, it is 64 m. in circumference. It occupies a deep crater and lies 4,700 ft. above sea level. On the S. side is the Indian town of Santiago de Atitlán.

Atitlán. Volcano of Guatemala. It lies at the S. end of Lake Atitlán, is 11,720 ft. high, and was occasionally active during the 19th century.

Atiu or **VATU.** One of the Cook islands in the Pacific Ocean. A dependency of New Zealand, it is 20 m. in circumference, being a mere bank of coral 10 ft. to 12 ft. in height. Pop. 1,086.

Atkin, JAMES RICHARD ATKIN, BARON (1867-1944). British judge. Born in Queensland, he was educated at Christ College, Brecon, and Magdalen College, Oxford. He was called to the bar by Gray's Inn in 1891, becoming a recognized authority on law relating to the Stock Exchange. In 1913 he was raised to the bench and in 1919 was appointed a lord justice of appeal. Ten years later he became a lord of appeal in ordinary; and, until his death on June 25, 1944, he was doyen of the judiciary, having then been a judge for 31 years.

Atkins, ROBERT (b. 1886). British actor and stage producer. Born at Dulwich, Aug. 10, 1886, and educated privately, he studied

at Tree's Academy, now the Royal Academy of Dramatic Art, in 1905, making a first stage appearance in Nero at His Majesty's Theatre in 1906. From 1920 to 1925 he was director of plays at the Old Vic. During this period he played Caliban, Richard III, Wolsey, Sir Toby Belch, and Sir Giles Overreach. A strong advocate of the retention of the apron stage and of the production of Shakespeare so as to preserve the spirit and tradition of the Elizabethan stage, he organized the Bankside Players. They gave performances of Shakespeare's plays in the Boxing Ring, Blackfriars, converted into an Elizabethan theatre in 1936. Atkins was director of plays at the Open Air Theatre, Regent's Park, London, 1932-39, and manager 1940-45; director at Stratford Memorial Theatre 1944-45. He was awarded the C.B.E. in 1949.

Atlanta. Capital and largest city of Georgia, U.S.A. It lies in the N.W. part of the state, 137 m. S.S.E. of Chattanooga, Tenn., by the state-constructed rly., and at the centre of several other rlys. It is laid out in the form of a circle. Here are Emory university, founded 1836, with over 2,000 students; and for negroes, Atlanta university, 1867, and Morris Brown college, 1885. The largest state-owned farmers' market in the world is at Atlanta, which exports cotton, tobacco, and mules. The city figured prominently in the civil war of 1861-65 and is portrayed in Margaret Mitchell's *Gone With the Wind*. Pop. 302,288.

Atlanta, BATTLE OF. Fought July 22, 1864, during the American Civil War, when the Northerners under Sherman besieged Atlanta. To relieve the pressure the Confederates under General J. B. Hood made a desperate but unavailing attack on the besiegers. A second attack, made on the 28th, the battle of Ezra Church, was equally unsuccessful, and on Sept. 1 the Confederates had to abandon Atlanta. See American Civil War.

Atlantes (plural of Atlas). Sculptured figures of men used as supports in place of ordinary columns. They are rarely found earlier than the neo-classic architecture of the 17th century, but in



Robert Atkins,
British actor

the great temple of Zeus at Agrigento, Sicily, there are pilasters projecting from the walls on which stand Atlantes supporting the roofs. Atlantes correspond to Caryatides, female figures used for the same purpose.

Atlantic Bases. By an agreement made between Great Britain and the U.S.A. on Sept. 2, 1940,

the U.S.A. transferred 50 over-age destroyers to Great Britain in return for 99-year leases of bases in British territory, to be developed as naval and air stations in Newfoundland (S. coast and Avalon peninsula), Bermuda (Great Bay), British Guiana, the Bahamas, Jamaica, St. Lucia, Trinidad, and Antigua.

ATLANTIC BATTLE OF 1939 TO 1945

Francis E. McMurtrie

Here are the facts of that grim struggle of the Second Great War in which Great Britain fought unceasingly to conquer the menace of German submarines in order to preserve the Atlantic communications which were vital to her existence. See also under Coastal Command: Submarine and Submarine Warfare

The German submarines from 1939 to 1945 tried to sever sea communications between the British Isles and America, and the Allied forces ceaselessly waged war against them, with ultimate success. This conflict has been justly described by Admiral of the Fleet Lord Cunningham of Hyndhope as the Trafalgar of the Second Great War.

Hostilities began with the destruction without warning of the Donaldson liner *Athenia* (q.v.), Sept. 3, 1939. Fortunately, the British merchant navy was somewhat better prepared for the onslaught than it had been in the previous war. During 1938-39 an appreciable number of masters and officers of British merchant vessels had attended courses of instruction in convoy duties and in methods of countering or evading submarine attack and many of their ships had been strengthened to allow for the mounting of defensive armament. Another factor which told against the U-boat attack was that in the years between the two wars the Royal Navy had developed effective devices for the location and destruction of submerged submarines. (See Asdic.)

Thus the enemy was driven to employ fresh tactics. A number of U-boats in a formation known as a "wolf pack" would attack on the surface at night, a method not easy to defeat. This was the German reply to the convoy system, put into force in the first month of the war. Up to the end of 1939 the results of the submarine campaign must have been disappointing to its planners, the total of British shipping sunk being only 115 vessels of 421,919 tons gross. On the other hand, the German flag had everywhere been driven from the seas.

Until the end of May, 1940, the Germans were able to do little in

the way of increasing this rate of destruction; but in June they were materially aided by two circumstances. Italy entered the war, adding greatly to the commitments of the British fleet, and throwing another 100 submarines into the struggle on the side of the enemy. Almost simultaneously France dropped out of the war, signing an armistice which gave Germany the use of her Channel ports. Norway, Denmark, the Netherlands, and Belgium having also been overrun by the enemy, U-boats were able to operate from various ports along the entire stretch of coastline from the North Cape to Bayonne. Naval forces available for anti-submarine service were severely reduced by the defection of the bulk of the French navy and the necessity for coping with the Italian fleet in the Mediterranean. From time to time such operations as the Dunkirk evacuation, the Malta convoys, landings in N. Africa, and the Japanese attacks on British possessions in the Far East, all tended to reduce the anti-submarine forces available in the Atlantic.

Including Allies and neutrals, a total of over 2,500,000 tons of shipping was sunk in the seven months from June to Dec. So serious did the situation become during this period that an agreement was made with the U.S.A. by which that nation ceded to Britain 50 over-age destroyers, built in 1917-1919, in exchange for the lease for 99 years of certain bases (v.s.). This timely reinforcement helped to fill the gap until new escort vessels ordered earlier in the war were forthcoming in adequate numbers. By the end of 1940 there seemed more hope of checking the submarine menace.

Italian participation in the battle of the Atlantic had been

definitely recorded during 1940, and some of the submarines sunk proved to be of that nationality. Another fresh development was a decided increase in the number of U-boats attacked and sunk by aircraft, the value of which for anti-submarine patrols was thus convincingly demonstrated.

In the course of 1941 the situation in the Atlantic, though for a time little change could be observed, underwent a gradual improvement. This may be attributed to a steady increase in the number of escorts available for convoys, as well as to growing proficiency of naval personnel in the technique of hunting submarines. A contributory factor was the U.S. navy's assumption of responsibility for the patrolling of the waters between the N. American continent and Iceland.

It had for some time become evident that, as in 1914-1918, the bulk of the destruction accomplished by U-boats was to be credited to a minority of exceptionally daring and skilful submarine captains. Several of these having been eliminated—notably Prien, Schepke, and Kretschmer—the intensity of the enemy attack tended to slacken as 1941 drew to a close. Up to Nov. the number of prisoners from enemy submarines was stated to be 1,310, of whom 467 were Italians, affording concrete evidence that the number of U-boats that had been destroyed was considerable.

Japan then made her surprise attack on the U.S. fleet at Pearl

Harbour, introducing a fresh complication for which little or no provision could be made.

With the U.S.A. as one of the Allies, the enemy was presented with a fresh and hitherto unexploited area of attack off the N. American coast. Here, in the early months of 1942, were to be found plenty of victims lacking weapons and escorts, and a fresh and serious rise in shipping losses was the inevitable sequel. Not only were the U-boats furnished with easy targets, but comparatively inexperienced personnel in newly commissioned submarines soon gained confidence from the practice so provided. Apart from American coastal shipping, the most serious losses were those of oil tankers from the Gulf ports, Venezuela and Curaçao.

This, the most dangerous crisis of the Battle of the Atlantic, was at length overcome by the institution of the convoy system in the Western Atlantic area, aided by the detachment of a number of British escort vessels and trained personnel to reinforce the U.S. navy and coast guard. Not for a considerable while were the Americans able to concentrate on the submarine menace in the Atlantic, all their energies being devoted to the restoration of the situation in the Pacific.

In the second half of 1942 the position improved perceptibly, a fact which the enemy tried to conceal by exaggerating his claims. One of these, made by an Italian officer named Enzo Grossi, en-

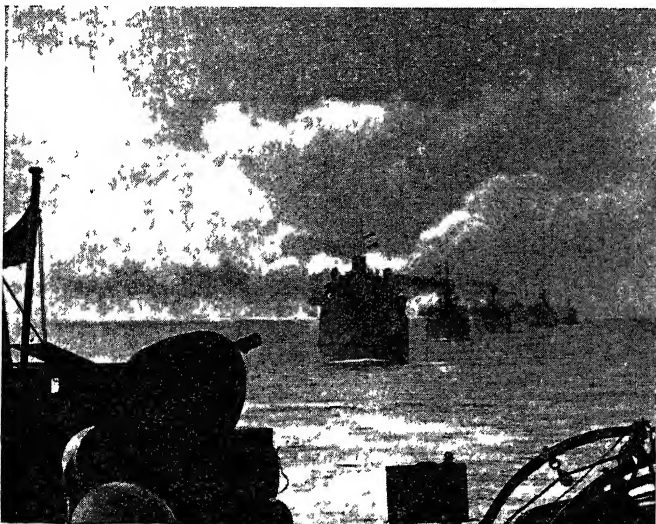
titles him to rank with Munchausen. In May, 1942, he reported having sunk a U.S. battleship of the Maryland class off the coast of Brazil, a story which Rome tried to support by announcing that 52 survivors had been landed at a S. American port. In fact, these 52 seamen were from a British cargo vessel.

Encouraged by the Iron Cross received from Hitler as a reward for his supposed achievement, Grossi declared four months later that he had torpedoed an American battleship of the Mississippi type off the West African coast. He maintained that he actually saw this ship sunk after being hit in the bow by four torpedoes. All that really happened was that Grossi's submarine, the *Barbarigo*, fired four torpedoes at H.M. corvette *Petunia* without hitting her. For his second effort of imagination Grossi was given the Knight's Cross by Germany and a gold medal for bravery by Italy, besides being promoted.

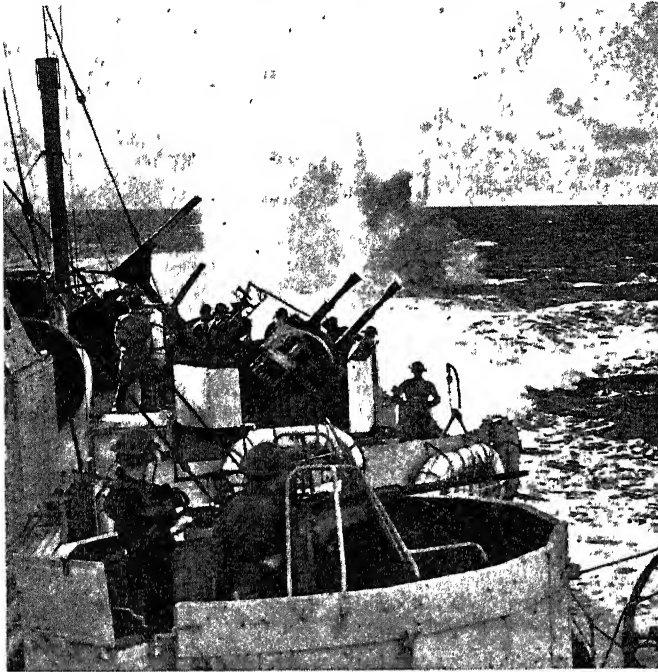
During 1942 there were many who advocated the construction of more fast merchant vessels, on the plea that this would be of material assistance in defeating the enemy campaign against commerce. It was pointed out in reply that faster ships would take longer to build and engine than the slower vessels of standard type, and would require to devote more of their space to bunkers. Sailing independently, there was no likelihood of their losses averaging less than those of slower ships in convoy; while if escorted, the provision of more fast escort vessels would be entailed.

At this date U-boat tactics had been more or less standardised. By making use of their speed, nearly double that of the average convoy, and operating in packs, they could spread themselves over a wide area of ocean and thus greatly increase their chances of sighting their prey. On sighting a convoy a submarine would report it and endeavour to keep it in view until nightfall, when the other units of the pack would close and attack on the surface. Obviously this method of attack needed less skill than did the individual approach usual in the previous war. It enabled the enemy to curtail considerably the training period for newly constructed U-boats, which, it is estimated, were then commissioned at the rate of 14 a month.

The anti-submarine activities of Coastal Command aircraft, which



Atlantic Battle. Convoy under British escort crossing the Atlantic, the ships in line formation. A convoy consisted usually of forty to fifty ships
Photo, "Daily Mirror"



Atlantic Battle. The Royal Canadian Navy played a vigorous part in crushing the submarine menace. Here H.M.C.S. Prince Robert is depth-charging a U-boat
Photo, Royal Canadian Navy

since Dec., 1940, had been under the operational control of the Admiralty, began now to bear more fruit. During 1942, 71 German and 2 Italian submarines were destroyed in the Atlantic, compared with a total of 66 German and 10 Italian from Sept., 1939, to the end of 1941; this was an encouraging sign in an otherwise black period. In 1942 also the escort a-raft carrier, later to become a potent factor in the hunting down of U-boats, made its first appearance; and all in service at this time were extemporised vessels, developed from mercantile hulls, mostly American.

During the ensuing twelve months the tide at last turned, and the enemy attack received a defeat from which it never recovered. Yet 1943 opened with the threat of an intensified onslaught on Allied sea communications. Dissatisfied with the conduct of naval operations by Grossadmiral Raeder, hitherto C-in-C. all German naval forces, Hitler took the drastic step of superseding him by his subordinate Grossadmiral Karl Doenitz, who had previously been in command of the submarine service.

Every effort was made by the enemy to impress neutrals with the belief that this change would

decide the battle of the Atlantic in favour of the Axis. Instead, the first lord of the Admiralty was able to announce that the results of anti-submarine operations in a period of four months had been "the most encouraging of the war," those of Feb. being the best experienced in any single month. Still there remained the question, would the appointment of Doenitz reverse this?

In March attacks certainly became more frequent, and losses were correspondingly severe. But simultaneously the influx of many more new escort vessels, including carriers, had its effect, and shipping losses in April were much lower than in March. Accounts published of attacks made on convoys by large packs of U-boats made it plain that escorts were being provided in much greater strength than formerly.

Closing The Gap

May proved to be one of the best months of the war for the number of submarines destroyed—41 in the Atlantic, five in other seas—more than could have been built during the same period. U-boat building was being overtaken by sinkings. In July it became known that the escort carriers were being used to close the mid-ocean gap between the extreme ranges of

shore-based aircraft on either side of the Atlantic. For some time the enemy had been making most of his attacks in this area in the belief that air patrols were unlikely to be encountered there. Extended endurance of the new escort vessels passing into service, and the provision of shore-based aircraft with very long range, which cooperated closely with our surface forces, also helped to bridge the gap.

An ample supply of escort vessels being now available, special hunting groups were formed with the object of intercepting enemy submarines on their way to and from bases on the French Atlantic coast. The name of Capt. F. J. Walker, R.N., became famous as leader of the most successful of these groups, composed of sloops or frigates, and often operating in conjunction with Coastal Command formations. The latter did great work in their 'Bay offensive,' as well as in the seaward defence of the Normandy landings in the following year.

On Aug. 14, a red-letter day in the records of the Atlantic battle, a joint statement signed by Winston Churchill and President Roosevelt revealed that in the three months of May, June, and July Allied forces had sunk 90 submarines, or at the rate of one a day. In Oct., 1943, the Portuguese government agreed to grant facilities for an Allied anti-submarine base in the Azores. Further good news came in Nov., when it was made known that in the six preceding months U-boat losses were not fewer than 150 units. Nothing approaching this rate of mortality had been known in the First Great War, when the largest number of German submarines lost in any six months was 46, and the total destroyed in the whole period from 1914 to 1918 was only 178.

Though less spectacular in the character of its announcements, 1944 continued to yield evidence of satisfactory progress, as in the announcement that, from the outbreak of hostilities to the end of July, more than 500 German submarines had been destroyed. Other comforting news was that Oct., 1944, was the month in which so far the fewest merchant vessels had been sunk. Loss of the use of French ports had further crippled the operations of U-boats, which were thenceforward based chiefly on Bergen and Trondhjem. Though still able to threaten convoys proceed-

ing to N. Russia, their claws had been blunted.

Systematic cooperation between sea and air forces had much to do with the defeat of the U-boats. Our own submarines also contributed their share.

In an endeavour to cope with the ascending scale of air attack, U-boats were re-armed with 37-mm. and 20-mm. anti-aircraft guns; and in the closing months of the war the majority of those operating had been equipped with a breathing tube, the *Schnörkel* (q.v.).

After the surrender in May, 1945, a hundred U-boats were found more or less damaged at Kiel, and 170 surrendered intact, 67 at sea. In all, 866 German and Italian submarines were sunk by Allied forces. *Consult* Battle of the Atlantic, H.M.S.O., 1946; German, Italian, and Japanese U-boat Casualties, H.M.S.O., 1946.

Atlantic Cable. The first Atlantic cable was laid between Ireland and Newfoundland in 1858, and the first telegraphic messages between the Old World and the New were exchanged Aug. 13 of that year. The cable failed through faulty insulation and the use of currents of too high potential. A second cable was partly laid in 1865 by the ship *Great Eastern*, but had to be abandoned temporarily on account of imperfections in the cable and difficulties in laying. In 1866 the same ship successfully laid a new cable, which was the first Atlantic cable of commercial value, and she recovered and completed the 1865 cable. In 1873 a fourth British cable was laid, and in 1879 a French cable was put into operation, followed by a German one in 1885.

Improvements in the making and laying of cables continued and others were soon in service. In 1871 the duplex system permitted simultaneous transmission of messages in both directions; speed of transmission is now 2,500 words a min. In 1946 twenty-one cables spanned the Atlantic. One of the first cables laid from shore to shore without break or fault was the Western Union line from New York to Cornwall via Newfoundland, completed in 1926.

The first high speed co-axial cable, which can carry several messages simultaneously, was laid in 1931 between England and Newfoundland via the Azores. The cable had to be laid as close as possible to the distance of 1,341 nautical m. specified by the engineers for the Azores-Newfoundland span if it was to function

efficiently. To that purpose, the exact route of the cable was measured by a continuous tape line of fine steel piano-wire.

All but six of the existing Atlantic cables are laid along a high submarine ridge known as Telegraph Plateau. The plateau, which was discovered during the laying of the first cable, is comparatively level, with a greatest depth of 2 m., and is covered with a soft ooze in which the cables are bedded, but from which they may easily be grappled and raised for repairs. The plateau makes it possible to use shorter and lighter cables than would be necessary to stretch over the alp-like surface of other parts of the Atlantic bed. On Oct. 18, 1929, a submarine earthquake severed twelve of the principal Atlantic cables, interrupting service for six weeks.

Atlantic Charter. Name given to an eight-point declaration issued by the U.S. president, F. D. Roosevelt, and the British prime minister, Winston Churchill, after a four-day conference on board H.M.S. *Prince of Wales* in the W. Atlantic, and first made public by radio in both countries simultaneously Aug. 14, 1941. There was no document signed. The U.S.A. was not then at war, which made her bold declaration of aims the more welcome to the Allies.

Terms of the "charter", basis of the Washington Declaration, (q.v.) were: (1) Great Britain and the U.S.A. to seek no aggrandisement. (2) No territorial changes that did not accord with the freely expressed will of the peoples. (3) Right of all peoples to choose their own form of government. (4) Means of trading and access to raw materials for all states needing them for economic prosperity. (5) Fullest collaboration between all nations in the economic field. (6) After the destruction of Nazi tyranny, a peace to ensure to all nations the means of dwelling in safety. (7) All men to traverse the high seas and oceans without hindrance. (8) Pending the establishment of a wider and permanent system of social security, disarmament of warlike nations to be essential.

Although the terms of the declaration had already been embodied, or were implicit, in recent speeches by Churchill, Roosevelt, and other British and American leaders, their formal affirmation was of great practical value in emphasising the unity of their aims and of their definition of the requirements of peace.

Atlantic City. City and popular seaside resort of New Jersey, U.S.A. It is 56 m. S.E. of Philadelphia, on the Atlantic City rly., and stands on a long, narrow, sandy island. It has a splendid beach, six long ocean piers, and a promenade 8 m. long. It claimed to have the world's first airport. Here was worked out in 1943 the project which became the United Nations Relief and Rehabilitation Administration, and here was held the first session of U.N.R.R.A., Nov., 1944, at which 44 nations were represented. Pop. 64,094.

Atlantic Ferry. Service operated by R.A.F. Transport Command for ferrying to Great Britain aircraft built in Canada and the U.S.A. The shipping of crated aircraft across the Atlantic entailed a lapse of some three months between the test flight in America and delivery to an operational destination in Britain. In addition, many aircraft were lost in ships sunk by enemy action. The first delivery of American landplanes flown across the Atlantic was completed Nov. 11, 1940, when seven Hudson bombers landed at Prestwick after a non-stop flight of 2,467 m. from Newfoundland. The aircraft were operating with Coastal Command a fortnight after their test flights in America. By the end of 1941 the Atlantic Ferry was operating a 24-hour service in all weathers. Under the direction of Air Chief Marshal Bowhill, who was appointed C-in-C. Ferry Command (merged into Transport Command in 1943), bases were established in Greenland and Labrador, and a network of radar and radio services was set up.

In Sept., 1941, the Return Ferry Service was started by B.O.A.C. to ensure the speedy return to Canada and the U.S.A. of those who flew aircraft to Britain. By the end of the war, the Atlantic Ferry had flown to Britain and to operational destinations in the Middle East, India, and the Pacific 10,000 aircraft valued at £500,000,000. The loss rate was slightly in excess of 1 per 1,000. In peace time, the Ferry continued a daily service and delivered large quantities of essential commodities and medical supplies to the liberated countries of Europe. Canadian troops were carried on the return flights. Flying in all weather conditions, the Atlantic Ferry accumulated invaluable data for speedy, comfortable, and safe trans-Atlantic passenger services of the future. See Bowhill, Sir Frederick.

ATLANTIC FLIGHTS: NORTH & SOUTH

Captain Norman Macmillan, M.C., A.F.C.

A record of the stages, since the unique pioneering achievement of Alcock and Brown in 1919, whereby the sky over the Atlantic Ocean has been opened up as one of the great highways of the world in war and peace alike

The Atlantic was first flown by a U.S. Navy N.C.4 Curtiss flying boat piloted by Lt.-Cmdr. A. C. Read. Leaving Newfoundland May 16, 1919, it refuelled at the Azores and Lisbon and reached Plymouth May 27. Five British and three other aircraft meanwhile mustered in Newfoundland to fly the Atlantic non-stop to win a Daily Mail prize of £10,000. Harry Hawker with Cmdr. Mackenzie Grieve started first in a Sopwith biplane, dropping the land undercarriage after taking off. Water cooling trouble forced them down hundreds of miles from Ireland, alongside a small vessel without wireless, and they were assumed lost until the vessel put in at the Faroe Is. Both airmen received the A.F.C.

Capt. John Alcock and Lt. Arthur Whitten Brown left St. John's in a Vickers Vimy bomber at 4.23 p.m. G.M.T., June 14, 1919, and landed at Clifden, Galway, 15 hrs. 57 mins. later, after flying 1,890 m., a world's record for distance flown non-stop. Both were created K.B.E.

First Airship Crossing

The first airship crossing and the first out and home flight were made by the British R.34, carrying Air Commodore E. M. Maitland, with Major G. H. Scott as captain of a crew of 30. The airship left East Fortune, July 2, and reached New York July 6, 1919. Leaving Mineola, Long Is., July 9, it arrived at Pulham, Norfolk, July 13. Its outward flight of 3,600 m. averaged 33.3 m.p.h.; the return of 3,800 m., 50.7 m.p.h.

The next N. Atlantic flight was made some time between Aug. 2 and 31, 1924, when two Douglas floatplanes, manned by American naval airmen, flew from England to Canada via Iceland and Greenland during one stage of the first complete flight round the world. Between Oct. 12 and 15, 1924, the German airship Z.R.3 (Los Angeles) flew 5,000 m. from Friedrichshafen to Lakehurst, N.J., on delivery to the U.S.A. as part of the First Great War reparations.

A £5,000 prize was offered for the first non-stop aeroplane flight between New York and Paris. On May 20-21, 1927, Capt. Chas. Lindbergh, flying solo in a Ryan monoplane of 225 h.p., completed

the journey to Paris in 33½ hrs. The first flight in the reverse direction was made by Major Dieudonné Costes and Lieut. Bellonte, who left Le Bourget Sept. 1, 1930, in a Breguet XIX and landed at Curtiss Field 37 hrs. 17 mins. later.

N. Atlantic air crossings were frequent from 1927 onwards. There were five in 1927, three in 1928, two in 1929, five in 1930, six in 1931, five in 1932, nine in 1933, and five in 1934. Airmen of many nationalities, essayed the flight—American, Australian, British, Danish, French, German, Hungarian, Irish, Italian, Polish, Spanish. Their aircraft ranged from light planes, like the Fuss Moth flown by J. A. Mollison in the first E.-W. solo flight from Dublin to Pennfield, New Brunswick, Aug. 18-19, 1932, to the large Dornier DO-X flying boat, manned by a crew of 14 under Christiansen, which flew from Newfoundland to Vigo via the Azores, May 19-22, 1932. In 1933 the Regia Aeronautica formations of 24 Savoia S.55X flying boats under Gen. Italo Balbo flew from Orbetello to Chicago via Iceland, July 1-15; and 23 returned via Newfoundland, the Azores, and Lisbon, Aug. 8-9.

Amelia Earhart's Solo Flight

The first E.-W. aeroplane flight was accomplished April 12-13, 1928, in a Junkers 33 by Capt. Hermann Köhl, Baron von Hünfeld, and Cmdt. J. Fitzmaurice of the Irish Air Force. They flew from Baldonnel, Dublin, to Greenly Is., Belle Isle Strait, Labrador. The first woman pilot to fly the Atlantic was Amelia Earhart, from New York via Newfoundland to Londonderry in a Lockheed Vega, May 21-22, 1932. This flight took 13½ hours.

The airships Graf Zeppelin, R.100, and Hindenburg made crossings; the German airships maintaining a regular trans-Atlantic air service until the Hindenburg was destroyed by fire at Lakehurst, May 6, 1937.

In 1937 experimental Anglo-American transport flights began with flying boats. Ground organization was in the hands of the governments, with air transport companies responsible for supplying aircraft and professional crews. Special sea and land airports were

established and radio stations erected. The aircraft used full aids to navigation. On July 5 the first Imperial Airways Short flying boat left Foynes, Eire, while the first Pan-American Airways flying boat left Botwood, Newfoundland. The route was extended at one end to Southampton, and at the other to Montreal and New York. Eight crossings were made that year.

The first wartime crossing was made by the Guba, a Consolidated commercial flying boat bought by the Air Ministry, in 16 hrs. 21 mins., Oct. 22-23, 1940, with a cargo of aluminium tubing. On Nov. 10, seven Hudson reconnaissance aircraft were flown by civilian crews from Newfoundland and landed in Great Britain next day. Thereafter thousands of aircraft were flown across by civilian and service crews, and a return air ferry service was maintained. (See Atlantic Ferry.) Hampden bombers were flown from Great Britain to Canada for training duties in the Dominion.

Trans-Atlantic Speed Records

On Sept. 6, 1945, a photographic reconnaissance-type Mosquito broke all Atlantic transit records, when with Wing Cmdr. J. R. H. Merifield as pilot and Flt. Lt. J. H. Spiers as navigator, it crossed from Newquay, Cornwall, to Newfoundland in 6 hrs. 58 mins. (2,300 m. at 330 m.p.h.). The return was made on Oct. 23 in 5 hrs. 10 mins. at an average speed of 445 m.p.h.

While B.O.A.C. maintained the Atlantic service with Boeing flying boats, landplane services were restarted by American companies with Douglas DC4s (Skymasters.) Flying from New York, via Gander, Newfoundland, and Rineanna, Eire, the first machine, owned by American Export Airlines, left New York Oct. 23, 1945, landing at Hurn, near Bournemouth, next day. P.A.A. flew their first landplane from New York on Oct. 28, and landed at Hurn next day, thus inaugurating a twice-weekly service between New York and London. The first American Overseas Airlines Chicago-London Service DC4 landed there Nov. 20. (See N.V.)

SOUTH ATLANTIC. Flights S. of the Azores and Bermuda, the N. Atlantic southern loop used by B.O.A.C. flying boats in the winter of 1945-46, may be defined as South Atlantic air crossings. The first of such crossings was made in 1922 by two Portuguese naval officers, Commander Cabral (pilot) and Admiral Cou-

tinho (navigator), in a Fairey IIC floatplane, flying via the Azores and S. Paul's Rock from Portugal to Brazil. Four years later a Spanish air crew—Commandante Franco, Capt. Ruiz de Alda, Ensign Beran, and Mechanic Rada—crossed in a Dornier Wal flying boat from Spain via the Canary Is., Cape Verde, and Pernambuco to Rio de Janeiro.

Italian airmen—the Marchese de Pinedo, Major del Prete, and Zachetti—next flew by stages from Sardinia to Pernambuco in a Savoia S.55 flying boat (Feb. 18-24, 1927). On March 2-18, 1927, Portuguese airmen—Commander de Beires, Duvalle Portugal, and Castilho Gouveia—flew a Wal from Lisbon via Casablanca, Villa Cisneros, and Bolama to Natal (Brazil). Dieudonné Costes and Lt. de Vaisseau Lebriz made the fifth, and first non-stop, crossing, flying a Breguet XIX from St. Louis, Senegal, to Natal (Oct. 14, 1927). Two Spanish and one French flight followed and then, on Jan. 6, 1931, Gen. Italo Balbo led ten Savoia S.55 flying boats from Portuguese Guinea to Natal during a formation flight from Rome to Rio de Janeiro.

Sqn. Ldr. H. J. L. Hinkler made the first flight from W. to E. and the first solo crossing when, during a 10,500 m. flight in a de Havilland Puss Moth from New York to London, he crossed from Natal to Bathurst on Nov. 26, 1931. J. A. Mollison made the first flight from Britain to S. America and the first E. to W. solo crossing in a Puss Moth via Barcelona, Villa Cisneros, and Thiés to Natal in Feb., 1933.

During the Second Great War Accra airfield became the main arrival base for aircraft flown across the S. Atlantic to reinforce the Middle East and Far East. Ferry pilots flew Baltimores, Bostons, Mitchells, Liberators, Marauders, and Dakotas from Nassau (Bahamas) to Accra in groups of from two to six via Puerto Rico, Trinidad, Belem, Natal, and Ascension Is. The ocean crossing was 2,810 m., with Ascension lying almost midway and having a single runway blasted out of lava rock, first landed upon in 1942. See N.V.

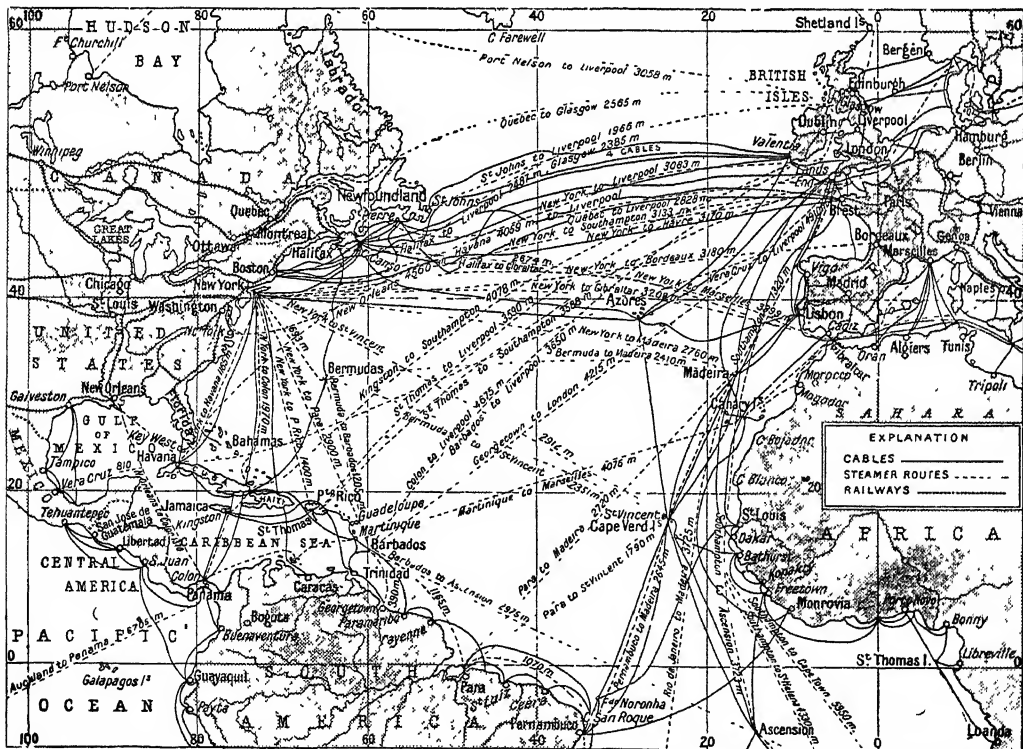
Atlantico. Department of Colombia. It lies between Magdalena and Bolivar, and borders on the Caribbean Sea. It has an area

of 1,340 sq. m. Cocoa, tobacco, sugar-cane are produced. Barranquilla is the capital. Pop. 268,409.

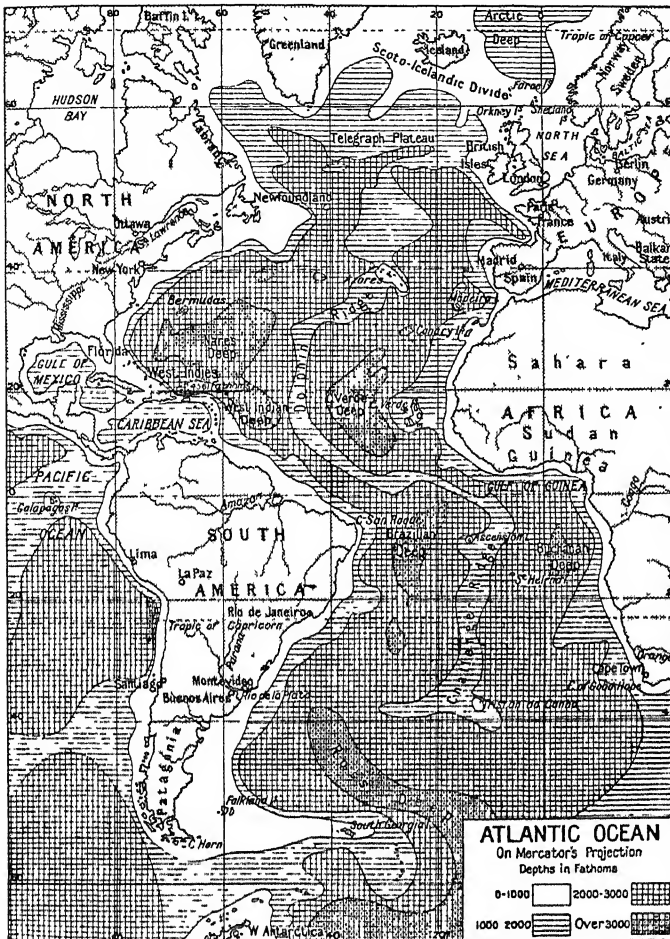
Atlantic Ocean. Second largest of the four great oceans. From N. to S. it is about 8,500 m. and from E. to W. between 2,500 m. and 4,500 m.; its area is about 31,500,000 sq. m. Constricted to about 1,500 m. N.E. of Cape San Roque, its main feature is its comparative narrowness. Wide open to the Antarctic in the S., it is cut off by a continuous submarine ridge from the Arctic basin.

From this Scoto-Icelandic divide, which joins the European Continental Shelf to Greenland and N. Canada, rise Iceland and the Faroes; between the latter and the Shetlands the E. portion, known as the Wyville-Thomson ridge, interferes with the S. movement of the Arctic waters, making the Atlantic waters warmer.

Roughly midway between the E. and W. margins, a long ridge rises from the floor of the Atlantic to within about 1,700 fathoms, nearly 2 m., of the surface. The N. end of this ridge forms the Telegraph Plateau between Ireland and Newfoundland; farther S. the Azores rise above it, whence



Atlantic Ocean. Map showing the relation of the European, African, and American continents to this ocean, with the principal cable lines and steamer routes and their distances



Atlantic Ocean. Map showing the ridges and deeps of the second largest ocean of the world, which in places has a depth of over five miles

to the Equator it is called the Dolphin Ridge. Near the Equator the ridge is less definite, but as the Challenger Ridge stretches beyond lat. 50° S.; from it rise the volcanic islands Ascension, St. Helena, and Tristan da Cunha.

Between the ridge and the margins the hollows contain a series of deeps more than 3,000 fathoms, 3½ m., below the surface; in two places the floor slopes steeply beyond 4,000 fathoms; the Blake deep reaches 4,561 fathoms, over 5 m. The border seas of the north—Hudson Bay, the Baltic and North Seas—are shallow; the Gulf of Mexico and Caribbean Seas are deep. The British Isles and Newfoundland rise from extensive continental shelves which are the most important fishing grounds of the world, with a depth of less than 100 fathoms or 600 ft.

The surface waters have a temperature of 80° F. in the narrowest portion, and are colder in higher latitudes until the limits of pack-ice are reached, where the temperature is about 32° F. The deeper waters are colder, and the bottom temperatures range between 34° and 40° F. The salinity of the surface waters varies between 3 and 4 p.c., and is lowest on the N. and S. fringes of the ocean and highest about the latitude of the tropics. The greater part of the floor of the ocean is covered with the greyish deposit, Globigerina ooze, while red clay lies in some of the deeps. See Continental Shelf; Gulf Stream; Sargasso Sea.

Atlantic Star. British Empire medal issued for service in the battle of the Atlantic. It was awarded for six months' service afloat in the Royal or Merchant

Navy in Atlantic or home waters between Sept. 3, 1939, and May 8, 1945. The ribbon is blue, white, and sea-green, watered and shaded. For a description of the star see under Campaign Stars.

Atlantis. Mythical island in the Atlantic. Larger than Asia Minor and Libya together, it was according to Plato populous and flourishing. But its immorality brought upon it the wrath of the gods, and it was swallowed up in a day and a night. Though there is no reliable evidence for the existence at any time of such an island in what is now the Atlantic Ocean, geologists and ecologists regard it as likely that land once above the level of the sea has sunk, and they seek to explain some facts of animal and plant distribution by the breakage in this way of previous land bridges. (See Gondwana Beds.) New Atlantis is the title of a philosophical work by Francis Bacon, depicting, somewhat in the style of More's Utopia, an ideal commonwealth.

Atlas. In Greek mythology, a giant. Having, with other Titans, rebelled against Zeus, he was condemned to hold up the heavens on his shoulders in the extreme far west, near the garden of the Hesperides (*q.v.*).

Atlas. Term first applied by Mercator to a collection of maps. It was derived from the figure of the giant Atlas bearing the universe on his shoulders, which was used to decorate the title page of the early volumes in which the maps were collected. Primarily an atlas is a book of maps which have an essential unity of conception or treatment. But a volume which contains specimens of all the known examples of a certain type of map, *e.g.* a reproduction of all the existing Portolano, or port-finding, maps of the medieval navigators, is not an atlas.

The most common and permanent type of atlas is an attempt to convey by means of maps a summary of the world as known to man. Since such a volume with its accompanying gazetteer or index would make a bulky atlas of the world, atlases are now frequently limited to maps dealing with only certain portions of the globe.

In the development of cartography various types of map have been evolved, and it is possible to publish an atlas containing maps of only one type, such as an orographical atlas, wherein all the maps specially depict, by means of contours, or hachures, or colour layers, the surface features or

relief of the earth both above and below sea level.

Similarly, maps are used to indicate the summarised knowledge of the climatic conditions which prevail throughout the world and together constitute an atlas of meteorology. The facts regarding plant or animal life, or rock structure, or the varied forms of life and physical conditions in the oceans, are mapped in atlases of zoology, geology, and oceanography. A useful commercial atlas presents a summarised picture of man's economic activities in all parts of the world. Comprehensive atlases contain an eclectic set of maps of many types. An original copy of Mercator's Atlas came to light at Ostend in 1920, dated 1613, and containing 197 maps. See Map and Map-making.

Atlas. In anatomy, the first cervical vertebra, supporting the globe of the head. It articulates above with the condyles of the occipital bone, two processes at the base of the skull; below, with the axis or second cervical vertebra and in front with the odontoid process of the axis.

Atlas Mountains (Berber *adrar*, a mountain). Mountain system in the N. of Africa. It consists of two

The Algerian or Eastern Atlas falls into two well-defined chains, the Tell Atlas in the N. and the Saharan Atlas in the S., between which is the lofty plateau of the Shotts. The Tell Atlas extends through the Rif territory of Morocco eastward along the line of the Mediterranean coast and drops away to the sea in steep escarpments. The interior chain fringes the Saharan desert and contains several summits exceeding 6,000 ft., although its crests frequently descend to the level of the desert, into which many spurs project.

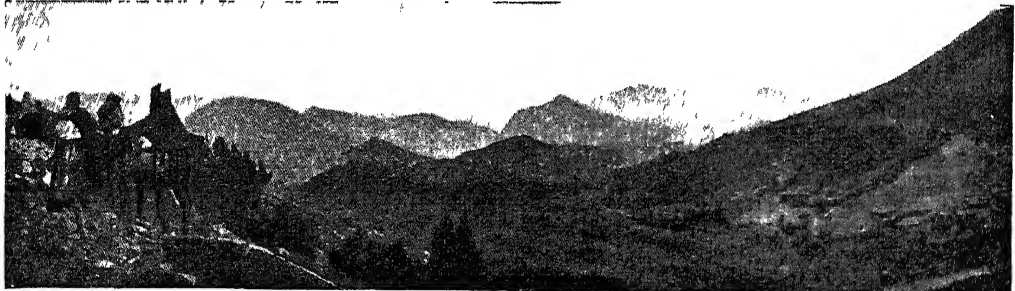
The mineral wealth of the Atlas Mts. includes copper, iron, antimony, salt, and marble, but their working is not extensively undertaken. Vegetation is mostly of the Mediterranean and African varieties, but Alpine flora occasionally occurs. The well-watered valleys are fertile and actively cultivated.

The Atlas forms the W. end of the great system of folded mts., including the Alps and Caucasus, which terminates on the shores of the Pacific beyond the Himalayas.

Atlas Powder. Modified form of dynamite. In it the nitroglycerine is absorbed in potassium nitrate and wood pulp instead of Kieselguhr. The proportion of

18th century by Priestley, Scheele, Rutherford, and others proved that the atmosphere is a mixture, the principal constituents of which are nitrogen, oxygen, and carbon dioxide. The atmosphere is denser in the layers near the surface of the earth and less dense above mountains and at still higher levels. The composition of the air is on the whole very uniform except in the amount of water vapour contained in it, which is greater in damp weather and in the vicinity of the sea and large lakes; the proportion of carbon dioxide is rather larger in the neighbourhood of large towns and volcanoes. The gases in the normal atmosphere consist of molecules of the various gases, and these molecules are in a state of constant movement. At a great distance above the surface of the earth the molecules break up into atoms which are electrically charged and are known by the name of ions.

Some of the gases in the atmosphere are heavier or denser than others; and in stating the composition of the air it is for this reason necessary to indicate whether this is taken by volume or by weight. The normal composition of dry air is, by volume:



Atlas Mountains. Panoramic view of part of the great system extending N.E. for 1,500 m. from Cape Nun in Morocco to Cape Bon in Tunis. The slopes are covered with vast forests and the valleys are inhabited by Berber peoples

main ranges, with many minor ramifications, and extends for about 1,500 m. from the Atlantic coast to the E. coast of Tunis on the Mediterranean.

The Moroccan Atlas comprises three main chains, running more or less parallel to each other. The principal and central of these is the Great Atlas, which attains a mean height of 11,000 ft., is densely forested, and has summits covered with snow for a great part of the year. It contains Tagharat, over 15,000 ft. high, the culminating peak of the entire system. On the S. of this chain is the Anti or Lesser Atlas, with a considerably lower elevation, and on the N. the Little or Middle Atlas.

wood pulp is 10-15 p.c., and two types of the explosive known as B and C contain respectively 60 p.c. and 45 p.c. of nitro-glycerine. Large quantities were used in the construction of the Panama Canal. See Explosives.

Atmolysis (Gr. *atmos*, vapour; *lysis*, loosing). Process of separating a mixture of two gases by making use of their different rates of diffusion through a porous partition. The process is analogous to that of osmosis (*q.v.*), applied to the separation of two liquids of different densities.

Atmosphere (Greek *atmos*, vapour; *sphaira*, sphere). The gaseous envelope which surrounds the earth. Researches in the

nitrogen 78.03 p.c., oxygen 20.99 p.c., argon 0.932 p.c., carbon dioxide 0.03 p.c., hydrogen 0.01 p.c., neon 0.0018 p.c., krypton 0.001 p.c., helium 0.0005 p.c., ozone (a modification of oxygen) 0.00006 p.c., and xenon 0.000009 p.c. As oxygen, argon, carbon dioxide, and some of the other gases are heavier than nitrogen and hydrogen, the proportion of the former gases by weight is greater than is stated above; thus oxygen contributes 23.2 p.c. of the weight of the air.

In general, animals take in from the atmosphere oxygen that is used to combine with the food-stuffs, especially those consisting largely of carbon; the carbon

dioxide produced in this way returns to the atmosphere through the lungs of the animals. On the other hand, plants absorb carbon dioxide from the atmosphere and give off oxygen through minute holes in their leaves. The atmosphere gradually becomes lighter the greater distance it is from the earth, and the molecules of the different gases become more widely separated from one another so that at a distance of several miles from the surface of the earth the atmosphere has almost ceased to possess the characteristics with which we are familiar; it would not support life and would not sustain combustion and its pressure on a barometer would be quite trifling. At a distance of about 60 miles above the surface of the earth the upper region is called the stratosphere, and the region in the neighbourhood of the junction of the stratosphere and the ordinary atmosphere has been called the tropopause. The temperature of the atmosphere becomes lower and lower the farther distant it is from the warm surface of the earth. At about 1½–2 miles away from the earth the temperature is on an average lower than the freezing point of water; at about 6–7 miles from the earth's surface it is supposed that the temperature is about -55°C .

Layer of Electrified Atoms

The boundaries of the various layers of the atmosphere are very indefinite and variable, and our information about them has been derived from observations on meteorites, on small balloons fitted with scientific instruments, from a study of the aurora borealis, and from careful research during recent years on radio-activity. The information collected from these sources appears to demonstrate with a considerable measure of certainty that at a distance of about 60–70 miles from the earth's surface there is a layer of electrified atoms of some of the atmospheric gases. This layer is known as the Kennelly-Heaviside layer; it was discovered independently by A. E. Kennelly and Oliver Heaviside in 1902. From this layer electric waves such as are used in radio work are reflected back to the earth's surface. If such waves are emitted from the earth's surface at an angle of about 40° or 50° they will be reflected back to the earth not to the place from which they were sent, but to another

place many miles away. The nature and degree of the reflection depend on whether the waves are emitted by day or by night and on the wave-length of the waves. For wave-lengths of about 1,000–2,000 metres in the daytime the reflecting surface seems to be about 40–50 miles away; by night it is about 60–70 miles away. When the wave-lengths are as short as about 100 metres or less the reflecting layer seems to be about 150 miles away. This reflecting layer is called the Appleton layer after its discoverer, Sir Edward Appleton. The whole of the atmosphere capable of reflecting radio waves is known as the ionosphere. It was concluded by Harrison and Dobson in 1925 that there is a considerable quantity of ozone in the upper atmosphere up to, very roughly, 100 miles from the surface of the earth. The green auroral line seems to be due to oxygen, but according to Rayleigh may be partly due to nitrogen.

The Atmosphere in Industry

The production of nitric acid, ammonia, and nitrates from the nitrogen of the atmosphere has become an important industry, and the supply, from this source, of fertilisers to the soil has been of enormous value to the growing population of the earth. The possibility of such an industry was made clear by the researches of Ramsay and Young in 1884, and of Le Chatelier in 1901, but the development on a manufacturing scale was worked out by Haber, Le Rossignol, and others at a later period, and the process began to be worked on a large scale in Germany before the First Great War. By cooling the air to a very low temperature and under great pressure, it can be liquefied, and by regulation of the pressure and temperature the liquid air can be distilled so that the nitrogen, the oxygen, the helium, the neon, and the argon can all be separately collected. For the manufacture of fertilisers nitrogen, obtained by the distillation of liquid air, is mixed with hydrogen, obtained by the electrolysis of water or from water gas, in the presence of an iron catalyst and under a pressure of 200–300 atmospheres. The nitrogen and hydrogen combine to make ammonia, which is oxidised to make nitric acid. From this nitric acid calcium nitrate and other nitrates are made in very large quantities. Further details of the processes are given in

chemical text-books, and especially in *The British Chemical Industry*, by Morgan and Pratt. From the atmosphere by means of cooling, high-pressure liquefaction, and distillation are obtained supplies of helium, neon, argon, and the other inert gases. Neon is used for neon signs; argon is used for filling incandescent lamp bulbs, and helium has been used for filling balloons.

Observations on the aurora are more successfully made in arctic or antarctic regions than in temperate regions. In northern Norway and Sweden the auroral displays are remarkable. The light of the aurora is electrical and is formed usually about 60–100 miles above the surface of the earth, though sometimes as far away as 500–600 miles. Auroral displays are connected with the electrical disturbances associated with sun spots.

Bibliography. *The Weather Map*, Sir Napier Shaw, 1916; *The Sea Surface and the Air: Scientific Results of the Norwegian Antarctic Expedition, 1934*; *The Humidity of the Air*, C. Burdick, 1938; *Investigation of Atmospheric Pollution*, Dept. of Scientific Research, 1939.

At Mrs. Beam's. Three-act comedy by C. K. Munro, produced by the Stage Society at the Kingsway Theatre, Feb. 17, 1921. Discursive and garrulous, it is set in a London boarding-house. The plot is without distinctive merit, but there are witty lines and interesting types, with Miss Shoe a memorable character. Selected by professional repertory companies as a representative comedy, it quickly became a favourite also with amateurs.

Atoll. Ring-shaped coral reef which constitutes an island enclosing a lagoon in the middle. Atolls vary considerably in size, from tiny rings to others whose diameters reach several miles, but they are all very low, as the coral polyp cannot live above the water level. Usually the reef is closely grown with coconut palms which take root in the sand formed by the decayed coral. The shallow lagoon often contains numerous pearl oysters. Frequently the coral ring is broken, and the atoll is horse-shoe or fret-saw shaped. Atolls occur in groups and lines. Their greatest development is in the south-western Pacific, particularly in a narrow band of ocean, more than 4,000 m. in length, between the Low Archipelago and the Marshall Archipelago. *See* Coral.

ATOM: ITS NATURE AND STRUCTURE

E. N. da C. Andrade, Director, Davy Faraday Laboratory, R.I.

This article explains succinctly the revolutionary discoveries arising from atomic research—the separation of the electron, or negative charge, from the nucleus, or positive charge, and the effect of nuclear change—which point the way to a new era in scientific achievement.

See also the article on Atomic Bomb, immediately following

The word atom is derived from the Greek, and means literally "that which cannot be cut, or divided." When the word was originally used it was believed that if we went on, in imagination, dividing matter up into smaller and smaller parts we should eventually come to small grains, or particles, which could not be further divided; these were the atoms. The fundamental feature of all modern science is the conviction that all substance is made up of characteristic particles, that it is granular in structure.

The science of chemistry is built up on the assumption that there are some ninety-two different kinds of matter which cannot be broken down by chemical means into anything simpler. These are the so-called elements. Each element is made up of atoms, all of which behave chemically in the same way. The lightest atoms are those of hydrogen, the heaviest those of uranium. The different kinds of atom are of different size, but they do not differ in magnitude so much as do the eggs of different British birds. It is therefore possible to speak in a general way of the size of atoms without speaking of any particular atom. Atoms are extremely minute: it is possible to form fairly precise estimates of their size from, among other things, a study of certain properties of gases and from consideration of the structure of crystals, in which they are built up more or less touching one another. They are about one-hundredth of a millionth of an inch across; the finest wire that can be prepared, which is itself about one-fiftieth of the diameter of a human hair, has about three thousand atoms packed side by side in a diameter.

Discovery of the Electron

Until some fifty years ago it was generally believed that the atoms of elements were ultimate particles, that they could not be broken up into anything simpler. The discovery of the electron, the atom of negative electricity, which could be produced from atoms of any kind and which was very much smaller than the smallest atom, suggested that the atom itself might be built up of electrons. As the electrons are negative charges,

and as the atom is normally electrically neutral, there must also be a carrier, or carriers, of positive charge.

The modern view, due to Lord Rutherford, is that the atom consists of a minute particle, called the nucleus, which carries the positive charge, surrounded by widely spaced electrons. The nucleus is very small indeed, even compared to the atom; if it be represented by a pea, which means multiplying its diameter by about a million million times, the outside boundary of the atom is something like a hundred yards away. The nucleus not only holds the whole positive charge of the atom, but nearly the whole mass, for the electrons are comparatively light.

How Atoms are Classified

The number of units of positive charge on the nucleus fixes the number of electrons, since by a unit of charge is meant the quantity of electricity in the electron, and since the atom as a whole must be neutral. The number of electrons determines their arrangement, and it is the number of outside electrons that decides the chemical behaviour of the atom. Hence the size of the nuclear charge gives the chemical species of the atom.

The number of units of positive charge on the nucleus is called the atomic number. To give examples, the atom of hydrogen, atomic number one, has a nucleus carrying one unit of positive charge; this hydrogen nucleus plays a great part in atomic structure and is called the proton, meaning, from the Greek, "the first thing." The atom of sodium, which is the eleventh when the elements are arranged in order of atomic weight, has eleven positive charges and atomic number eleven. In general, the atomic number is the number of the element in question when the elements are all arranged in order of atomic weight.

It used to be thought that all atoms which had a given chemical behaviour were identical in all respects. As the result of the work of F. W. Aston, following on certain pioneering experiments of J. J. Thomson, it is now known that atoms of a given chemical species may have different masses

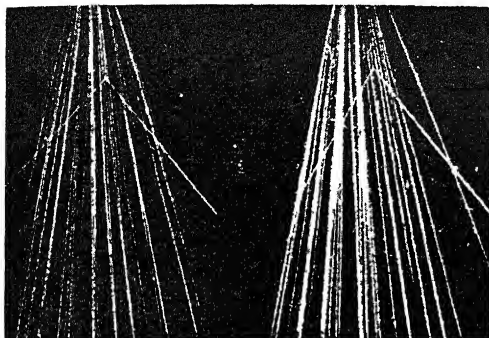
—for example, there are chlorine atoms of mass 35 and chlorine atoms of mass 37, taking the mass of the hydrogen atom as unity.

Ordinary chlorine is a mixture of atoms of these two kinds, the lighter being the commoner, so that the atomic weight of chlorine is 35.46. Atoms of different mass having the same chemical properties are called isotopes of the element in question; thus it is said that there are two isotopes of chlorine. The word isotope is derived from the Greek and means "having the same place," since the isotopes of an element have the same place in the so-called periodic table, in which the elements are distributed according to chemical properties. The nuclei of isotopes of a given element have, then, the same charge but different masses.

The existence of isotopes is explained in terms of the structure of the nucleus. There are certain particles called neutrons which have about the same mass as the hydrogen nucleus but carry no electric charge. They can be considered as protons without charge. The nucleus is built up of these neutrons and protons. The number of protons gives the number of units of positive charge and hence the chemical properties of the atom. Each proton also contributes one unit of mass. The neutrons contribute mass only, and do not affect the chemical properties. Hence different isotopes of one element contain different numbers of neutrons, but the same number of protons.

Nuclear Changes in the Atom

If we can tamper with the nuclear charge we can change the nature of the atom, that is, transmute one element into another, to do which was the alchemist's dream. The chemical processes used by the alchemists, and all other chemical processes, only affect the outer regions of the atom and leave the nucleus untouched. The first indications that nuclear changes were possible were given by the radio-active bodies: certain of these elements send out spontaneously from the nucleus a so-called alpha particle, carrying two units of positive charge and four units of mass, i.e. an atom of helium, and so become other elements. Others undergo a nuclear change which finally results in the loss of an electron, a unit of negative charge; this also leads to a change in the chemical nature of the element. These radio-active transformations,



Atom. This photograph, by Dr. P. M. S. Blackett, shows the paths of alpha rays in helium gas after the successful bombardment of an atom

however, take place of themselves, at a rate which cannot be hurried or retarded by ordinary laboratory processes. The nuclei of such radio-active elements are, then, unstable, and at odd times fall to pieces of themselves.

By bombarding light elements with alpha particles Rutherford succeeded in breaking the nuclei of certain light elements and so transforming their nature. In much of the work he had the co-operation of Chadwick. Later Cockcroft and Walton used for the same purpose electrified particles which were given high speed by an electric field in an exhausted tube. These particles were a kind of artificial alpha particle, of a different chemical nature, not so energetic but far more numerous. Their impact also effected nuclear changes. All such positively charged particles are repelled by the nucleus and so have to be very swift to get near it. Neutrons have the advantage that they are uncharged and so can penetrate easily into the charged nucleus, and with their aid Fermi and others have produced many atomic transmutations.

In all these cases very few atoms are transformed. It is only because of the great sensitiveness of the methods used that the effects can be detected at all. It was soon realized that in many of the nuclear changes a relatively great amount of energy was liberated per atom, but it required so much effort to provoke the change in a very few atoms that no use could be made of the process, although it was of the highest scientific interest.

In 1939 a new effect was produced by bombarding uranium with neutrons: the nucleus was split into two parts, which rushed apart with great energy. At the same time neutrons were given out

and it turned out that only one, uranium 235, was suitable for the bomb. The separation of this isotope is a most tedious and costly process and accounts for much of the trouble in producing the bomb. Releasing of nuclear energy in a sudden rush on a large scale has thus been shown to be possible. To be able to release it in a controlled way is necessary before industrial use can be made of it.

The outer parts of the atom are inhabited by electrons which, although very sparsely distributed, can prevent the outer parts of other atoms intruding. In the hydrogen atom a single electron effectively patrols a comparatively immense space, and even in the heaviest atoms the outer parts are very thinly occupied. The electrons are arranged more or less in shells, of which the outer shell is usually incomplete. It is these outer electrons that give the main chemical properties of the atomic species: it is energy changes among them that lead to the emission of light by atoms. Chemistry, spectroscopy, and the emission and absorption of X-rays are all inseparably bound up with the electronic structure of the atom, outside the nucleus. Thus the old chemistry is the study of the behaviour of the outer electron of the atom. The study of the behaviour of the nucleus is the chemistry of a new era in science.

Atomic Bomb. Bomb in which the explosive force is derived from atomic fission. As explained under Atom, when atoms of certain elements are bombarded with neutrons (*q.v.*) the atomic nuclei can be split, with the liberation of a relatively enormous amount of energy. The effect depends upon the equivalence of mass and energy, propounded as part of his relativity theory by Einstein in 1905. A very small mass of matter

represents an enormous amount of energy. A mass of one ounce, if it could be entirely converted into heat energy, would be sufficient to transform about 1,000,000 tons of water into steam. One pound of uranium 235 in an atomic bomb would in theory be equal in effect to 8,000 tons of the explosive T.N.T.

Atomic bombardment has been carried out for a number of years as a laboratory operation by the use of the cyclotron (*q.v.*) or similar apparatus. It involves the input of a comparatively large amount of energy in the form of electricity at high voltages, but the amount of matter that could be handled was so tiny that the resultant output of energy was small. By 1939 scientists in many countries were studying the possibility of atomic fission on a scale large enough to yield a source of energy available for industrial power, and were investigating the use of atomic energy in lethal weapons. Uranium, the element commonly chosen for the operations, consists of the isotope (*q.v.*) of mass 238 to the extent of 99.3 p.c., the isotope of mass 235 to 0.7 p.c., and the isotope of mass 234 to the extent of 0.008 p.c. Only the first two are suitable for the purpose, and the first is fit only for what are called slow neutron operations, and is less suitable for use in an atomic bomb.

The problem was therefore to separate from uranium a sufficiently large amount of isotope 235; this was done by the gas-diffusion process, the work being carried out largely in the U.S.A. Uranium itself is derived mainly from pitchblende, of which there are large deposits in Canada and the Belgian Congo. The work of preparing the atomic bomb was shared by the governments of Great Britain, Canada, and the U.S.A. In 1940 an investigating committee of scientists was set up in Great Britain with Sir George Thomson as chairman; at first it was under the Air ministry, and later the ministry of Aircraft Production. In the middle of July, 1941, this committee reported that the feasibility of a military weapon based on atomic energy was established. Endorsed by the war cabinet, the project was then entrusted to a division of the department of Scientific and Industrial Research, of which Sir E. Appleton (*q.v.*) was secretary. In October, 1941, President Roosevelt suggested to Winston Churchill that the work should be carried on jointly by

Great Britain and the U.S.A. A U.S. mission came to Britain in Nov., 1941, and British scientists visited the U.S.A. in the following Feb. Great plants in the U.S.A. were placed under the responsibility of the U.S. secretary of War. One at Oak Ridge, Tennessee, employed over 65,000 persons. Another great group of buildings was erected at Richland, Washington. In the late summer of 1943 many British scientists working on the atomic bomb were transferred to the U.S.A. in order to join the appropriate groups there.

For the final stages of the project, an atomic laboratory staffed by physicists and chemists from Britain and the U.S.A., under the direction of J. R. Oppenheimer, was established in 1943 at Los Alamos, New Mexico.

Concurrently the governments of Germany and Japan were striving to produce an atomic weapon. But the Anglo-American experiments came first to fruition. At 5.30 a.m. on July 16, 1945, the first atomic bomb in the history of mankind was detonated at Alamogordo, a U.S. army airfield in the New Mexico desert, 120 m. S.E. of Albuquerque.

The bomb was exploded from the top of a tall steel tower, while scientists and military experts occupied observation posts at a distance of 17,000 yards. The explosion caused a great boiling, surging cloud of many colours to rise to some 40,000 ft. in height. The heat of the explosion, estimated at several millions of degrees, completely vaporised the tower; where it had stood was a huge crater, the floor of which consisted of glass formed by the fusion of the sand.

Destruction of Hiroshima

At 8 a.m. on Aug. 6, 1945, the first atomic bomb to be used in warfare was dropped by a Superfortress of the U.S.A.A.F. flying at 30,000 ft. over the Japanese mercantile city of Hiroshima (*q.v.*). The bomb was dropped by parachute and exploded 1,000 ft. above the centre of the city. The flash of the explosion was observed by a reconnaissance aircraft 170 m. away. The entire business section in the centre of the city was destroyed over an area of 2 m. in diameter. Of Hiroshima's population of 343,000, 78,150 were killed, and 58,839 injured; though many of the latter later succumbed to the gamma rays generated by the bomb's release of atomic energy. Some 95 p.c. of people within a quarter mile of the explosion were

killed outright, and 50 p.c. exposed to radiation at a distance of one mile eventually died.

Three days later, at 11 a.m. on Aug. 9, a Superfortress released a second atomic bomb over the industrial city of Nagasaki (*q.v.*). This dropped between the two large Mitsubishi ordnance plants in the N. part of the city. As in Hiroshima, virtually every building within a radius of one mile was razed to the ground. Casualties were 73,884 dead, 76,796 injured. The effects of the flash burns and gamma rays were similar to those in Hiroshima.

What Happens on Detonation

When an atomic bomb of this type detonates, a ball of fire one-third of a mile in diameter, with a central temperature of about 4,000,000° F., is formed at the centre of the explosion. The effect of this sudden generation of great heat is an immediate expansion which violently repels the air once occupying the centre of the explosion. This pressure, or blast wave, destroys or damages all structures in its path.

At the instant of explosion great numbers of radium-like rays are emitted. These rays affect the blood-forming tissues in the bone marrow, and the whole function of the blood is impaired. The blood does not coagulate, but oozes in many spots through the unbroken skin, and internally seeps into the cavities of the body. The white corpuscles which counter infection disappear, and persons subjected to the rays usually die within two or three weeks of the exposure.

Each of the atomic bombs detonated over Japan had an explosive effect equivalent to that of 20,000 tons of T.N.T. Because of severe censorship, the immediate moral effect caused in Japan by the use of the two bombs was limited; but they gave the Japanese govt. a decisive reason for surrender, Aug. 14, thus making invasion of Japan unnecessary and, in the view of U.S. military experts, shortening the war by a year and thus saving possibly millions of Allied and Japanese lives.

With a view to testing the effect of the atomic bomb on warships, a combined experiment by the United States Navy and Army Air Forces was carried out at Bikini Atoll (*q.v.*), and attended by representatives of the United Nations. Some 73 U.S., German, and Japanese warships were assembled for the test. Known as Operation Crossroads, the experi-

ment cost £125,000,000 and employed some 42,000 men and several hundred ships of all descriptions to man, supply, and administer the tests. The target ships were, of course, unmanned, but large numbers of animals were placed on board to test the reaction of living things to the rays emitted by the atomic explosion. Cameras and recording instruments were set up in steel towers on the shores of the lagoon to provide a record of the explosion.

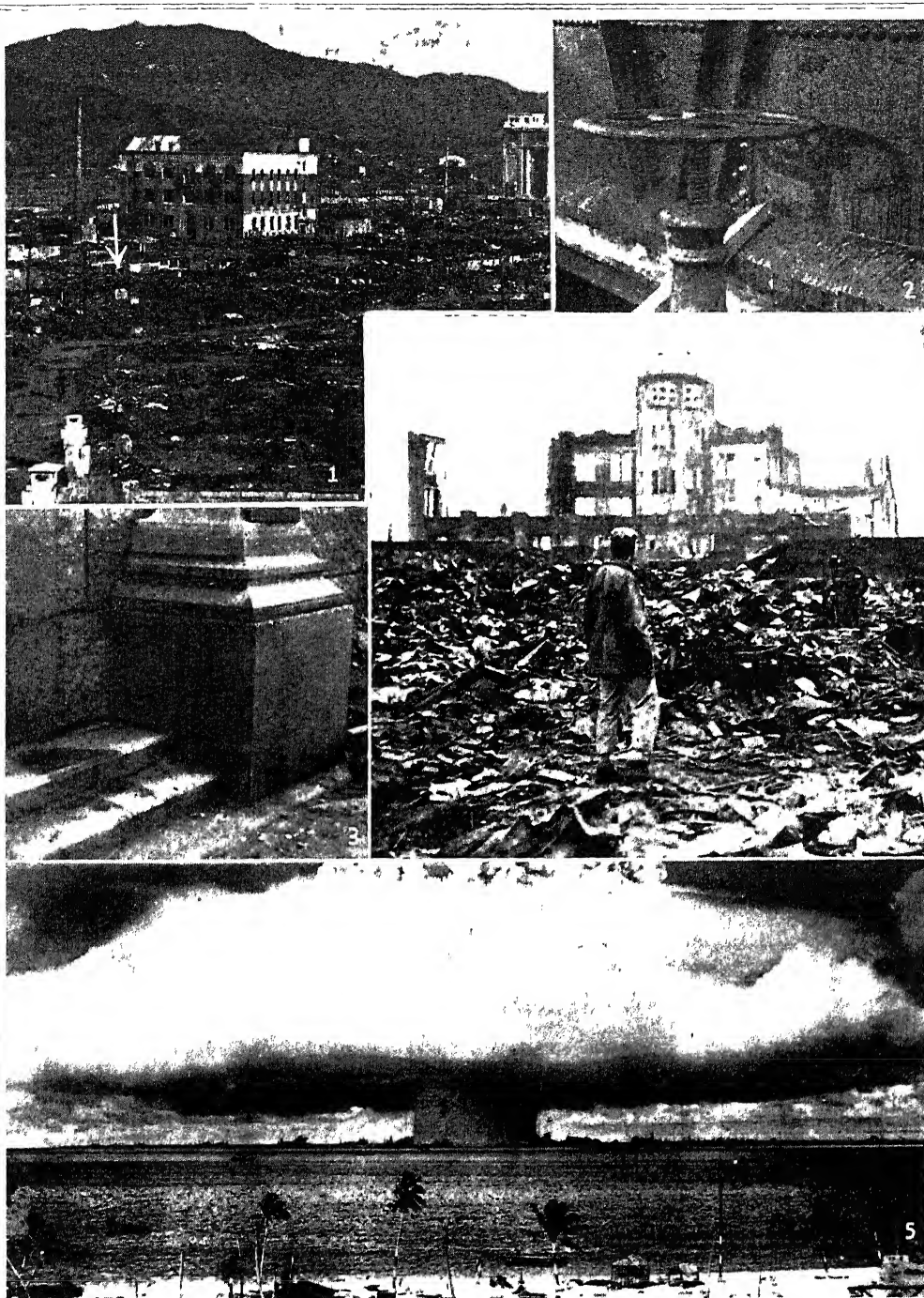
The first part of the test took place, July 1, 1946, when a Superfortress dropped the world's fourth atomic bomb on the target fleet. Its fuse was set to burst the bomb in the air above the ships; this sank or damaged 20 vessels, those totally lost being all small vessels. Little damage was done to the hulls of the battleships and cruisers, but blast wrecked their superstructures and all light deck-gear. Had the ships been manned, casualties amongst the crews would have been heavy. It was not until the following day that the rays had dissipated sufficiently to make it safe to board the ships still afloat.

Second Bikini Experiment

The second Bikini bomb was exploded July 24, this time beneath the water. The explosion threw up a column of water 2,200 ft. across and 5,500 ft. high and estimated to contain 10,000,000 tons of water. Lateral blast pressure initiated waves 100 ft. high from the centre of the explosion. The explosion sank two battleships and an aircraft carrier, and severely damaged a number of other vessels.

The Bikini tests proved less destructive to the structure of ships than had been anticipated, but the rays emitted by the explosion raised entirely new problems in naval architecture and warfare. Radio-activity, estimated to have been equivalent to many hundreds of tons of radium, poisoned the sea and temporarily made the ships death traps. A few minutes' exposure would have incapacitated the crews and caused their deaths within a few days. The second bomb caused a deluge of water saturated with radioactive elements over some 90 p.c. of the target area.

Exclusive possession by the U.S.A., and part possession by Great Britain and Canada, of the secrets of atomic bomb manufacture gave rise to political implications and speculations from the end of the Second Great War.



Photographs 1-4 are of the Japanese town of Hiroshima after the explosion over it on August 6, 1945, of the first atomic bomb used in warfare. 1. Centre (indicated by the arrow) directly above which the bomb burst. 2. Detail of gasholder 1½ m. from the centre of damage: the bituminous coating of its sides was damaged by heat radiation except where it was shielded by the

valve-wheel and spindle, the area thus protected showing up afterwards like a shadow. 3. Similar "shadow" left by a human body on steps 200 yds. from the centre of damage. 4. Walls of the gutted theatre left standing among debris. 5. Mushroom-shaped cloud produced by the underwater explosion of an atomic bomb in the lagoon at Bikini Atoll on July 24, 1946

ATOMIC BOMB: EFFECT OF EXPLOSION OVER HIROSHIMA, AND UNDERWATER AT BIKINI

Photos 1, 2 and 3, from "The Effects of the Atomic Bombs at Hiroshima and Nagasaki," H.M. Stationery Office; 4, Associated Press, 5, Keystone

An Atomic Energy Commission (*q.v.*) was set up by the United Nations; and both the U.S.A. and the U.K. continued to study possible uses of atomic energy for peaceful as well as warlike ends. U.S. monopoly of the secret of producing atomic explosions appeared to end during 1949, President Truman announcing on Sept. 22 that such an explosion in the U.S.S.R. had been detected.

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Atomic Energy Advisory Committee. Body, of which Sir John Anderson was chairman, set up by the British govt. in Aug. 1945, to give technical advice on development of atomic power for use in industry and in war. It advised the development of Harwell (*q.v.*) experimental station. It was dissolved Jan. 7, 1948.

Atomic Energy Commission. Body set up by the U.N. Feb. 23, 1946, to discuss ways of international control of the use of atomic energy. On it were represented all members of the security council plus Canada. From its first meeting in New York, June 14, deadlock attended its deliberations, Russia refusing support for proposals by Bernard Baruch (*q.v.*) on behalf of the U.S.A., and having her own proposals outvoted. The commission suspended its activities from May, 1948, to Feb., 1949, when it resumed discussions, which continued to be fruitless.

Atomic Number. Term used in chemistry to denote the number of an element when arranged with others in order of increasing atomic weight. It is equal to the total number of orbital electrons in an atom of the element. Atomic numbers were first assigned by Moseley (*q.v.*) from observations on the characteristic X-ray spectra of the elements. See Chemistry.

Atomic Weights. In chemistry it is of great importance to know the relative weights of the atoms of the various elements, and tables of these relative weights have for a century or more been published. Originally hydrogen was taken as the standard and given the atomic weight of 1; afterwards oxygen was taken as the standard and given the atomic weight of 16. It

was discovered in 1913, independently by Soddy and by Richards, that there were two varieties of lead with identical properties, except that one had heavier atoms than the other. Soddy called such different varieties of the same element isotopes, and over more than thirty years it has been proved that most elements are mixtures of isotopes (*see Atom*). The proportion of the different isotopes in most chemical elements occurring in nature remains nearly constant; both hydrogen and oxygen are mixtures of isotopes, and whichever element is taken as a standard the resulting relative weights of the various atoms are seldom exactly whole numbers. The atomic weights, which are now the relative weights of an average atom of an element compared with an average atom of oxygen, have been determined with great accuracy and are revised from time to time by an international committee of chemists. The atomic weight of aluminium is 26.97, of boron 10.82, of carbon 12.01, of gold 197.2, of helium 4.003, of hydrogen 1.0080, of oxygen 16, of tin 118.7, and of uranium 238.07. Uranium is itself a mixture of three isotopes with atomic weights of 234, 235, and 238 respectively. A full list of atomic weights will be found under Chemistry.

Atonement. Word used in a religious sense to imply reconciliation with God through sacrifice. In all religions men dread the judgement, and desire the forgiveness of God, or of the gods, and seek to avert the one and secure the other not only by prayer, but also by sacrifice. It depends on the stage of moral development in any religion whether moral transgression or ceremonial offence is the more seriously regarded.

The sacrifice offered in the lower stages of moral religious development is conceived as a gift so well pleasing to the god to whom it is offered that it changes his anger into favour. If the deity is conceived as malevolent, the death of the victim may be regarded as satisfying this feeling because of the pain and loss involved. When conscience is awakened, and the connexion between transgression and penalty is recognized, the death of the victim is regarded as substitutionary for that of the transgressor. Even when the conception is less definite, some sort of equivalence between the sacrifice and the suffering which the sin deserves is assumed. —

The conception of atonement, as it meets us in the history of religions, is not merely, as modern liberal theologians often represent it, at-one-ment, or reconciliation, a restoration of the interrupted relation, moral and religious, of God and man; reconciliation is the result, but atonement is the means by which the end is brought about. The complementary conceptions of expiation and propitiation must not be excluded. In offering the sacrifice the sinner offers a compensation for the wrong he has done; by thus recognizing his own ill-desert, and the claim the deity has for some such compensation, he turns displeasure into favour: in expiating his sin, he propitiates the god worshipped, and so his sacrifice atones in restoring him to that relation to his god which his sin had interrupted.

Sacrifice and Forgiveness

This is the conception of atonement involved in the universal institution of sacrifice. In the O.T. the contrast between the popular and the prophetic religion is at once noticeable. For the one the number and the costliness of the offerings were regarded as determining the efficacy of sacrifice to turn God's judgement into forgiveness; for the other goodness and godliness were insisted on as the sole conditions of God's good will towards men (Micah 6, 6-8). While the prophets denounced the false view of sacrifice as atoning, it is in a psalm (51, 17) that "a broken and a contrite heart" is represented as the acceptable sacrifice unto God, to which God responds in forgiveness. In the description of the suffering servant of Jehovah in Isaiah 53, the greatest advance is made in the O.T. towards the Christian conception; the righteous is made a sin-offering for the sinful people, and by his sacrifice secures their salvation.

In the N.T. Jesus describes His death as a ransom for many (Matt. 20, 28), and as the sacrifice of the new covenant unto forgiveness (Matt. 26, 28; 1 Cor. 11, 25). As there is evidence, however, that He accepted as predictive of His own vocation the description of the suffering servant just referred to, it may be assumed that He regarded His sacrifice as securing salvation because atoning for sin. The Epistle to the Hebrews exposes the failure of the whole Levitical ritual to meet man's need of a conscience cleansed from sin (9, 14; 10, 2, 22), and lays stress on two elements in the sacrifice of Christ as giving it value, His

perfect sympathy with man (2, 17, 18; 4, 15), and His perfect obedience unto God (10, 8, 9; 5, 7-9). He accepted in obedience to God and sympathy with man all the consequences of human sin.

Paul regards Christ's death as propitiatory (Romans 3, 25), "as showing both the divine wrath and the appeasement of that wrath." Christ's death as a sacrifice, the endurance of sin's penalty on behalf of men, if it does not render God propitious in the sense of changing hate to love, or anger to mercy (a heathen notion), at least exhibits Him as propitious, as both forgiving and judging sin. As His "passing over of the sins done aforetime in His forbearance" (v. 25, R.V.) might give the impression of His indifference, in the death of Christ His righteousness was exhibited. By His propitiation men are redeemed (set free) from sin, guilt, law, and death, and God and man are reconciled.

In the history of the Christian Church the view of the Atonement has been always affected by the dominant religious interest and current theological conceptions. In paganism the power of demons was dreaded. Accordingly, in one of the earlier theories of the Atonement, Christ's death was regarded as a ransom paid to the devil in order to set men free from his dominion, to which at the Fall they had subjected themselves. In the feudal atmosphere Anselm thought of sin as an insult to the honour of God for which an adequate compensation must be offered; the voluntary death of Christ, who as sinless was not under the doom of death, afforded an infinite satisfaction because of the infinity of His person as God. With the development of judicial punishment by established government the Atonement came to be regarded (as by the Reformers) as the endurance by Christ in His death of the equivalent penalty of man's sin.

A later political development with a corresponding theory led Grotius to represent the death of Christ as an expedient of God as moral governor of mankind to impress on men what sin deserves. The ransom, the satisfaction, the substitution, and the governmental theories are the main historical forms of the doctrine of the Atonement. None is accepted by contemporary theology. See Christianity; Incarnation.

Alfred E. Garvie

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Atonement, DAY OF. Great fast day of the Jews. Defined in the Talmud as The Day, and observed on the 10th day of the seventh month of the sacred year, or Tishri (Sept.-Oct.), it is the one day of humiliation or expiation commanded in the Mosaic law. It is said to have been instituted either on account of the sin and punishment of Nadab and Abihu, or as commemorating the day on which Moses came down from Sinai with the tables of the law and proclaimed forgiveness for the worship of the golden calf. Familiar as Yom Kippur, directions as to its observance are given in Ex. 30; Lev. 16, 23; and Num. 29. Referred to by Philo and Josephus, its relation to the Christian Atonement is dealt with in Heb. 9 and 10.

Atrato. River of Colombia. Rising in the western Cordillera, it flows about 400 m. N. to the Gulf of Darien, which it enters through 16 mouths. Its mouths admit vessels only of about 4 ft. draught, though the upper river is navigable by steamers for more than 250 m.

Atrauli or **ATROWLI**. Municipality of the United Provinces, India, in Aligarh district. It lies 70 m. by rly. N. of Agra, is an old, but well-built town, and was a local headquarters of the mutineers in 1857. More than half the inhabitants are Hindus, most of the remainder are Mahomedans.

Atrebrates. Tribe inhabiting Berkshire and the neighbourhood at the time of the Roman invasion of Britain. There were also Atrebrates in northern Gaul, the modern Belgium. *Prox.* At-re-bay-teez.

Atrek. River of Persia. It rises in Khorassan and flows into the Caspian after a course of 350 m. For part of this it forms the boundary between Russia and Persia. At its mouth it is normally only 30 ft. wide, but when flooded in spring spreads to a width of 2 m.; at other times it is almost exhausted by evaporation and the withdrawal of water for irrigation.

Atreus. In Greek mythology, son of Pelops and grandson of Tantalus. He and his brother Thyestes, having murdered their half-brother Chrysippus, fled from Pisa in Elis to Mycenae, where Atreus became king. Owing to an

intrigue with Aërope, wife of Atreus, Thyestes was driven from Mycenae. To avenge himself he sent Pleisthenes, son of Atreus, whom he had brought up as his own son, to kill his brother, but Pleisthenes was slain by Atreus in ignorance of his identity. Discovering what he had done, Atreus, under pretence of reconciliation, invited Thyestes to Mycenae, and served to him at a banquet the children of Thyestes by Aërope. This crime called down upon the house of Atreus the curse of the gods. The tragic fortunes of the Atridae, notably Agamemnon (*q.v.*) and Orestes (*q.v.*), were favourite subjects of Greek drama.

Atri. City of Italy, in Teramo prov. The ancient Hatria, it lies 8 m. from the Adriatic and 7 m. W. of its station, Atri-Mutignano, on the Brindisi line. It has a fine 13th cent. Gothic cathedral and palace of the Acquaviva family.

Atrium. Originally the entrance hall of a Roman dwelling-house. In a building of the early and simple type it was the principal room, and contained the hearth whereon the cooking was done. The more elaborate atria of Pompeian houses were courts partly covered by a roof. In the early days of Roman Christianity, many upper class houses were places of reunion for converts, and in the atrium penitents had to await their turn. Hence, when the basilica was adopted as the model of the Christian place of worship, the atrium became essential to the ritual. It was usually surrounded by covered ambulatories or cloisters.

This form of atrium may be studied in the basilica of S. Ambrogio at Milan (9th century), but in most instances the space occupied by the atrium has been given to other buildings. See House.

Atropatēnē. Old name of a district of N. Persia, now approximately the province of Azerbaijan. It owes its name to Atropates, a general of Alexander the Great, who, after the death of his master, established an independent kingdom here. For about five centuries after 100 B.C. Atropatene was under the suzerainty of Armenia. See Persia; History.

Atrophy (Gr. *a*, not; *trophē*, nourishment). In biology, a change in the living process of a plant or an animal, as the result of which the individual diminishes in size or function, either as a whole or in part. General atrophy is usually the result of lack of nutrition, or disease. Local atrophy may affect either a single organ or tissue in

whole or part, or a group of allied tissues. Examples of local atrophy are to be found in certain organs, which disappear or become smaller at definite periods of life. Thus, the thymus gland diminishes during childhood. The uterus diminishes in size after parturition. Certain bones, such as the lower jaw, undergo the same process in old age, constituting senile atrophy. These are normal processes.

Local atrophy may also occur as the result of disease, especially if nourishment cannot reach the part affected. Excessive use over a long period of time may cause atrophy of muscles and glands. Injury to the nervous system affects tissues similarly. Continuous pressure, as in the former Chinese custom of bandaging the feet, produces a like effect. The evidence of atrophy is seen in the gradual wasting away of the tissue or individual concerned, to an extent which may even reach emaciation. The changes which take place in the tissue itself are that the cells constituting the tissue diminish in size and lose some of their characters, and tend to lose their power of reproduction, so that not only are they smaller in size, but ultimately less in number. See Biology; Embryology.

Atropine. Alkaloid prepared from the deadly nightshade or *Atropa bella 'onna*. See Belladonna.

Atropos (Gr. *a*, not; *trepein*, to turn). In Greek mythology, the eldest of the three Fates, the others being Clotho and Lachesis. Clotho spun the thread of life, Lachesis distributed men's lots, and Atropos, the inflexible, cut the thread. See Fates.

At Sight. Commercial term meaning payable on demand. It applies chiefly to bills of exchange and promissory notes. If on these the words "at sight" are written they are not entitled, like ordinary bills of exchange, to the customary days of grace. See Bill of Exchange.

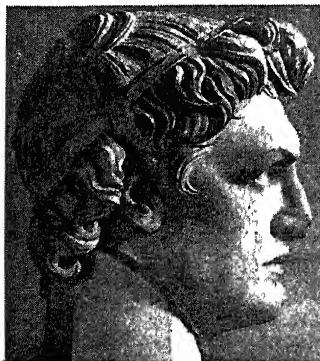
Atsugi. Important Japanese aerodrome 22 miles from Tokyo. This airfield was frequently bombed by the U.S.A.A.F. in 1944 and forward elements of the American 11th Airborne division landed here on Aug. 28, 1945, forming the advanced guard of the main army of occupation. General MacArthur (*q.v.*) landed at the aerodrome on Aug. 30.

Atsuta. Town of Japan, in Honshu. It stands on the S. coast, near Owari Bay, 70 m. E. of Kyoto and almost adjoining Nagoya, on the rly. It is noted for its 7th century Shinto temples.

in one of which the Sacred Sword, one of the three imperial regalia, is stored.

Attaché (Fr., attached). Subordinate official attached to an embassy to gain diplomatic experience, and enjoying some of the privileges appertaining to the official diplomatic service. Intending diplomatists usually gain their early experience as attachés. Military, naval and air officers are detailed for duty as attachés on the staff of ambassadors, to observe and report on matters of professional interest. In time of war the neutral powers usually send officers to be attached to the staff in the field of each belligerent, to observe and make independent reports on the operations to the governments appointing them. See Diplomacy.

Attachment. In English law, the writ by which a person against whom a judgement has been given or order made by the court is arrested, or attached, to compel



Attalus. Finely sculptured head of Attalus I, king of Pergamum. Berlin Museum; from Delbrück, *Antike Porträte*.

his obedience. It can only be issued by leave of the court. When the writ is applied for, the court always gives the person against whom it is applied for an ample chance to obey the order, and so escape arrest; but if he is contumacious the writ will go in the end. See Writ.

Attainder (Old Fr. *atvindre*, Lat. *attingere*, to attack). Obsolete legal term. In feudal times any person found guilty of treason or felony of a capital kind was declared attainted, i.e. his lands were forfeited, and no one could inherit land from or through him. Attainders began in England about the time of Edward II, and were common during the Wars of the Roses, when each party condemned its opponents in this way, thus securing their lands. In 1459

the Yorkist lords were attainted at Coventry, and in 1461 Henry VI.

It was towards the end of this period that bills of attainder were introduced into Parliament, this being a legislative, not a judicial, method of removing obnoxious persons and acquiring their land. Under Henry VIII attainders were frequent. Thomas Cromwell suffered by such an act, and later, Strafford and Laud. The death penalty was inflicted under a writ of attainder for the last time upon Sir John Fenwick in 1697, although it was used for minor punishments until attainder was abolished in 1870. The last bill of attainder passed in England was against Lord Edward Fitzgerald in 1798. See Treason.

Attalus. Name of three kings of Pergamum. Attalus Soter, by his alliance with the Romans against Philip V of Macedonia, established and increased his kingdom. Under his able rule the art flourished and that splendour originated for which Pergamum, as a centre of Hellenistic culture, was famous. He died 197 B.C. His second son, Attalus Philadelphus, reigned 159-138 B.C., following in all things his father's policy. His nephew, Attalus Philometor, reigned tyrannically 138-133 B.C., bequeathing his kingdom to Rome at his death.

Attar of Roses. Alternative name for Otto of Roses (*q.v.*).

Attempt (Lat. *ad*, to; *temptare*, to try). In law, an endeavour to commit a crime. It used to be thought that a prisoner could not be found guilty of an attempt when if he had consummated his act he could not have committed the crime: for example, that it was impossible to be legally guilty of an attempt to pick a pocket when the pocket was empty. This doctrine is now exploded. A prisoner indicted for a crime in England may be found by the jury not guilty of the crime, but guilty of attempting to commit it, although he has not been specifically indicted for the attempt.

Attention (Lat. *attendere*, to direct towards). In psychology, direction of the mind towards an object. An essential factor is the amount of interest taken in the object, which attracts involuntarily (passive attention), or incites the will to energetic activity (active attention). There are some things it is impossible not to notice; others require an effort of will. A third stage has been called secondary passive. The mind, from being actively engaged in work, becomes so taken up with it that the work

becomes automatic; active becomes passive attention.

Atterbom, PER DANIEL AMADEUS (1790–1855). Swedish poet. Born at Osbo, in East Gothland, Jan. 19, 1790, he was educated at the university of Uppsala, in which he became professor of philosophy (1828) and of aesthetics (1835). Leader of the Swedish romantic school, Atterbom helped to start the Aurora League in 1807 for the propagation of its views, and he edited two critical organs in which poems and essays by its representatives appeared: *Phosphoros* (1810–13), and the *Poetic Calendar* (1812–22). He was admitted to the academy in 1839, and died July 21, 1855. His best known works are *The Flowers*, a cycle of lyrics, and *The Isle of Happiness*, 1823, a romantic drama.

Atterbury, FRANCIS (1662–1732). English divine and politician. Born at Milton, Buckinghamshire, March 6, 1662, and educated at Westminster and Christ Church, Oxford, he was ordained in 1687 and became one of the royal chaplains. His championship of the Church of England, and his successful efforts for the revival of convocation, brought him in 1701 the archdeaconry of Totnes, and in 1704 the deanery of Carlisle. A pronounced Tory and high churchman, he was the principal composer of Sacheverell's defence before the House of Lords in 1710, and in 1712 was appointed dean of Christ Church, Oxford, and in 1713 bishop of Rochester and dean of Westminster.

Soon after the accession of George I Atterbury began to communicate with the exiled Stuarts in France, and in 1722 was imprisoned in the Tower for plotting their restoration. He defended himself before the House of Lords, but was condemned, on certain compromising letters, and banished for life. He died in France, Feb. 22, 1732, and was buried privately in Westminster Abbey. He inspired Charles Boyle's attack (1698) on Richard Bentley regarding Bentley's exposure of the spuriousness of the so-called Letters of Phalaris, and was the author of numerous controversial works and sermons. As a preacher and a political orator, he was held amongst the greatest of his time. *Consult* Life, H. C. Beeching, 1909.

Attestation (Lat *ad*, to; *testis*, a witness). The signing by a person of a statement to the effect that he was present as a witness when another person signed a document. Witnessing was not

necessary to any deed or document at common law. By the Wills Act, 1837, all wills, except wills by persons on actual military service or marines at sea, are required to be attested by two witnesses, who are to be present at the same time and subscribe their names in the testator's presence. A declaration to this effect in writing is usually added at the foot of the will, and is desirable to save trouble, though not strictly necessary. Deeds are usually attested by one witness for each person who executes the deed, though this is not necessary except in a few cases, e.g. bills of sale.

Attic. Term usually applied to a room on the top storey of a building. Properly speaking, it is a room with vertical walls, as opposed to a garret, the walls of which slope inwards from the cornice of the structure. An attic storey is often employed as an architectural device to diminish the apparent height of a building's front. The use of the term is confined to neo-classic buildings, the construction being supposed to belong to the Attic style of architecture. In Roman architecture the term is applied to a purely ornamental construction above the entablature.

Attica. A district of ancient Greece, bounded by Boeotia on the N., Megara on the N.W., and the Aegean Sea on the E. and S.W. The surface is partly plain and partly mountainous, among the well-known mts. being Hymettus, Pentelicon, and Cithaeron. Owing to the unproductiveness of the soil, a large proportion of the population took to the sea for a living. The intellectual keenness of the people of Attica was attributed by ancient writers to the dry and braising climate. Attica and Boeotia together form a nome or dept. of Greece with a pop. of 1,144,330. *See* Greece: History.

Atticism. Use of correct and elegant diction. The language of the people of Athens and Attica was considered to represent the highest standard of literary Greek. A refined, incisive form of wit was characterised as Attic salt.

Atticus, TITUS POMONIUS (109–32 B.C.). Roman literary man and publisher. Educated with Cicero and the younger Marius, on the outbreak of the war between Marius and Sulla he withdrew to Athens in 85, and did not return to Rome until 65. For the rest of his life he steadily kept aloof from politics, taking no part in the war between Julius Caesar and Pompey, and liv-

ing on friendly terms with the leaders of all parties. His most intimate friend was Cicero, whose letters to Atticus are a model of familiar correspondence. An Epicurean in philosophy, familiar with Greek and Roman literature, and a man of great wealth, he possessed a large library and carried on an extensive publishing and bookselling trade. He was the author of a chronicle of Roman history, and of an account of Cicero's consulship written in Greek. He starved himself to death at Rome on discovering that he was suffering from an incurable disease. His biography was written by Cornelius Nepos.

Attila (c. 400–453). King of the Huns. He succeeded to the chieftainship in 434, when his people were masters of E. Europe N. of the Danube and the terror of the west up to the Rhine, and of W. Asia. Attila broke over the Danube (447) into the Balkan peninsula, compelling the emperor at Byzantium to cede him territory and pay a huge tribute. In 451 he stormed westwards; the German tribes through whose territories he passed were forced to swell the ranks of his army. But the Roman general Aëtius and Theodoric of Toulouse, the king of the West Goths (not to be confused with the more famous Theodoric the Ostrogoth), united to resist the invading hordes. Attila then laid siege to Orleans, where he was held in check until Aëtius and Theodoric appeared with relieving armies. Then he fell back to the valley of the Marne, where he relied on making full use of his mounted hosts. In the Catalaunian plains near Châlons, in June, 451, a terrific battle took place, with the result that the eastern hordes were decisively defeated.

But Aëtius did not strike home; Attila was allowed to retreat to Pannonia. Next year (452), with reorganized hosts, he burst into Italy, ravaged the north, and even reached the defenceless gates of Rome, when he turned back. Overawed, according to tradition, by the majesty of Pope Leo I, who came forth in state to bid him hold his hand, he retired to the headquarters of his dominion in the modern Hungary. Attila demanded and was promised the hand of Honoria, the Roman emperor's sister, but in 453, before the nuptials could be celebrated, he died suddenly—slain, it was said, by the hand of another jealous wife. *See* Huns; Rome: History. *Consult* Attila: The Scourge of God, M. Brion, 1929.

Attleboro. Town of Bristol co., Massachusetts, U.S.A. It is 32 m. S.W. of Boston on the New York, New Haven, and Hartford rly. It contains a state armoury and the Attleboro Home Sanitarium, manufactures jewelry, cotton goods, machinery, and leather, and has bleaching and dyeing works. It was incorporated in 1694. Pop. 22,071.

Attleborough. A market town and parish of Norfolk, England. It is 16 m. S.W. of Norwich by the railway. The ancient capital of Norfolk, it had a Holy Cross college, founded 1387. Market day, Thurs. Pop. 2,608.

Attlee, CLEMENT RICHARD (b. 1883). British statesman. He was born at Putney on Jan. 3, 1883, one of a large family, of well-to-do middle-class parents, and was educated at Haileybury College. Thence he went to University College, Oxford, where he gained second class honours in modern history. At the university his politics were Conservative, and his first speech in debate there supported a policy of protection.

Soon after leaving Oxford, however, he was considerably influenced by reading the works of William Morris and Ruskin. Under this influence he went to work in a social settlement at Limehouse; here he acquired firsthand knowledge of the misery and drabness of the lives of London's poor. The political consequence was that he attached himself to the Labour movement. In 1907 he joined the Fabian society and the Independent Labour Party, and began active political work.

Called to the Bar at the Inner Temple in 1905, he practised for some years. Later, he undertook secretarial and lecturing work in the campaign for the reform of the Poor Law. In 1912 he became lecturer in sociology at the London School of Economics. This post he held until the outbreak of the First Great War in 1914. Volunteering for service, he was given a commission in the South Lancashire Regt., and saw service in Gallipoli and Mesopotamia, where he was severely wounded. After convalescence in England, he served in France for the last few months of the war.

Released from the army in 1919, he resumed his political activities, and stood as Labour candidate for the L.C.C. at Limehouse, but was defeated by a narrow margin. In the autumn of 1919, Labour gained control of the Stepney borough council, and

Attlee accepted the mayoralty of the borough.

Attlee entered parliament in 1922 as member for Limehouse. In the general election Labour



Clement Richard Attlee, who became British prime minister, 1945

became the official parliamentary opposition for the first time, and Attlee became parliamentary private secretary to the Labour leader, Ramsay MacDonald. Within a year another general election took place, with the result that the first Labour government was formed in Jan., 1924. In this administration Attlee was under-secretary of state for War. In the autumn of 1924 the Labour government fell. Re-elected for Limehouse in the subsequent election, Attlee was again on the opposition benches. In 1927 he was appointed a member of the Indian Statutory Commission, on which he afterwards spent the greater part of two years in India and Burma.

Second Labour Government

In the general election of May, 1929, Labour won office for the second time, and Attlee was appointed to the sinecure post of chancellor of the duchy of Lancaster, in order that he might devote his attention to such matters as imperial preference, agriculture, and the Economic Advisory Council. In the spring of 1931 he was appointed postmaster-general and given his first opportunity as head of a department, but this lasted for five months only, for in Sept. the government came to an end and MacDonald headed a National government. With the great majority of the Labour party Attlee refused to have anything to do with the new coalition.

The election that followed in Oct. resulted in a heavy defeat for Labour, fewer than sixty Labour

members being returned to parliament. Of these Attlee was one, though with a greatly reduced majority. As the only Labour ex-cabinet minister in the attenuated party, George Lansbury was elected leader, and Attlee his deputy. Thus unexpected electoral fortune raised him from the position of junior minister to deputy leader of His Majesty's Opposition. In this position his industry and versatility served him well, and he won the respect of his party. For nine months in 1933, while Lansbury was incapacitated by illness, Attlee as acting leader discharged his responsibilities with credit. When Lansbury resigned the Labour leadership in Oct., 1935, on the issue of pacifism, with a general election imminent, Attlee was elected acting leader for the period of the election. This leadership was subsequently confirmed by a substantial majority.

In Dec., 1937, during the Spanish Civil War, he visited Spain to encourage the Republican forces; and to mark their appreciation the Republican leaders named a battalion of the international brigade the Attlee battalion.

Deputy Prime Minister

In May, 1940, when the Labour party accepted Winston Churchill's invitation to join his new government, Attlee became lord privy seal and a member of the war cabinet. He held this office until Feb., 1942, when, on a reconstruction of the government, he became secretary of state for Dominion Affairs and deputy prime minister. In Sept., 1943, he became lord president of the council, continuing as deputy prime minister. These offices he held until the Churchill National government ended in May, 1945.

The general election held in July, 1945, resulted in an overwhelming victory for the Labour party, which obtained for the first time a large majority over all other parties in parliament. Attlee thus became, on July 26, prime minister and minister of defence in the first Labour government supported by a large parliamentary majority. His immediate task was to take Churchill's place at the Potsdam conference with President Truman and Marshal Stalin. On Aug. 14, 1945, he announced the end of the war with Japan. In Nov., 1945, he flew across the Atlantic to confer with the U.S. president and the Canadian prime minister on problems arising from the

Atomic Bomb (*q.v.*). During his visit he addressed the U.S. congress and the Canadian parliament. See N.V.

Ernest Thurtle

Attock. District of W. Punjab, Pakistan, in the Rawalpindi division. Bounded on the W. by the river Indus, it contains 519,000 people within an area of 4,025 sq. m., of which only two-fifths are cultivated. Attock Fort was built by Akbar to protect the passage of the Indus, and it still has great strategic value. The Attock Bridge at this point is also of commercial and military importance. Oilfields are worked near by. Most of the people are Mahomedans.

Attorney (late Lat. *attornatus*, turned to). In English law and kindred systems, one who acts as agent for another, especially in matters of legal moment. As a rule, an agent is not now called an attorney, unless he is appointed under a deed, called a power of attorney, to act in the absence of his principal abroad or in similar circumstances. An attorney-at-law is a public officer who conducts legal proceedings on behalf of others. Before 1873 an attorney was a person entitled to conduct proceedings on behalf of his clients in the common law courts, while one who conducted suits in chancery was called a solicitor. Many practitioners were both. The Judicature Act, 1873, abolished attorneys-at-law in England, and made them all solicitors of the supreme court, entitled to practise in any branch of the high court and the court of appeal. In the U.S.A. and in some of the overseas dominions of the British Empire, legal practitioners are still "attorneys and counsellors at law."

Attorney-General. Chief law officer of the British Government, and head of the English bar. Chosen from among the prominent lawyers who belong to the party in power and sit in the house of commons, he is a member of the government of the day, but only in exceptional cases is he a member of the cabinet. He conducts cases on behalf of the crown, advises the various departments of state on legal matters, and, if necessary, defends such advice and action in parliament. His salary is £10,000, professional fees being set off.

There is also an attorney-general in Northern Ireland. The various British Dominions and the duchies of Lancaster and Cornwall have each an attorney-general, those in the crown colonies being civil servants, and

those in self-governing dominions politicians, the duties of all being to advise on legal matters. In the U.S.A. the attorney-general has a seat in the cabinet, and nearly every state has a similar official. In Scotland the lord advocate is the equivalent of the attorney-general, first appointed in England in the reign of Edward I, when there was a king's attorney to look after his interests in the law courts.

Attornment. An acknowledgement by one person that he is the tenant of another. When a man mortgages a house in which he dwells, he generally makes an attornment, by which he acknowledges that he is the tenant of the mortgagee. When the property changes hands, and the tenant acknowledges (generally by paying rent) the title of the new landlord, he is said to "attorn tenant" to him; and after that he cannot deny the new landlord's title, and the new landlord can distrain. See Mortgage.

Attraction (Lat. *ad*, to; *trahere*, to draw). Force that draws one material body or particle to another. The most important forces of attraction are gravitation, electrical attraction, and magnetic attraction. Gravitation is the force that keeps the sun, moon, earth, and other planets in their relative positions and causes a body in the air to fall to the surface of the earth. It was suggested by four people in the second half of the 17th century that this force varies inversely as the square of the distance separating the two bodies concerned. Between 1684 and 1687 this was proved by Newton and the proof was published; it was experimentally confirmed by Cavendish in 1798 and by subsequent men of science.

The unit of electrical attraction is the electron, a tiny body that sometimes behaves as a minute particle having a definite position and a definite mass or weight, and at other times seems to be a vibration capable of travelling through space with the velocity of light. The attraction of one chemical atom to an atom of a different chemical element is a special variety of electrical attraction, and regulates the formation of chemical compounds. Chemical attraction varies between the very strong and the very weak; the attraction between an atom of one element and another atom of the same element is frequently a comparatively weak attraction. The attraction between an atom of one element and an atom or atoms

of another element may be a strong attraction or a weak one. Some of these weak attractions are called van der Waals forces and are believed to account for the cohesion of groups of atoms to each other in solid bodies. A crystal of common salt consists of an equal number of sodium atoms and chlorine atoms uniformly spaced so that each sodium atom is surrounded by and attracted by six chlorine atoms and conversely each chlorine atom is surrounded and attracted by six sodium atoms. It appears from such structures that the attraction of one atom to another atom is frequently only a fractional part of the unit of attraction, the electron. Capillary attraction, by which water rises inside a glass tube against the pull of gravity, is probably a variety of van der Waals forces or cohesion. The attraction of the magnet to iron filings is electrical. See Atom; Gravitation; Matter; Motion.

Attribute (Lat. *attributum*, something ascribed). In metaphysics, a real, essential quality of any being or substance, the presence of which makes it what it is. Thus, sense and intelligence are attributes of man; length, breadth, and thickness, of body. In logic, an attribute is that which is affirmed or denied of the subject of a proposition.

Attu. Most westerly of the Aleutian Islands, in the N. Pacific, lat. 52° N., long. 173° E. of Greenwich. Belonging to the U.S.A., it was invaded by Japanese forces, June 13, 1942: it was heavily bombed, most of the buildings being destroyed, and evacuated by the enemy on Oct. 7. They occupied it again, Nov. 29, and received further bombing attacks. On May 11, 1943, U.S. troops landed and by the end of the month had annihilated the Japanese garrison.

Attwell, MABEL LUCIE (b. 1879). English artist. She was born in London, June 4, 1879, and was educated at Coopers' Company School. She studied art at the Regent Street Art School and Heatherley's. Her drawings of chubby-cheeked and rosy-faced children became immensely popular, and appeared in



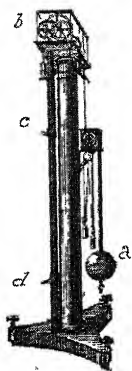
Typical drawing by Mabel Lucie Attwell

many periodicals, creating a new style in child studies. Children's books which she illustrated included editions of *The Water Babies*, *Alice in Wonderland*, *Andersen's Fairy Tales*. The *Mabe Lucie Attwell Children's Annual* was for many years very popular.

Attwood, THOMAS (1765–1838). English composer. Born in London, Nov. 23, 1765, he became a chorister at the Chapel Royal. He attracted the attention of the prince of Wales, who sent him to study in Italy, whence he moved to Vienna to become a pupil of Mozart until 1787. He was organist at St. Paul's, London, in 1796; musical instructor to the royal family, and a founder member of the Philharmonic Society and of the Royal Academy of Music. Organist to the Chapel Royal in 1836, he died at Chelsea, March 24, 1838. Attwood's fame rests on such sacred compositions as the coronation anthems, *I was glad*, 1820, and *O Lord, Grant the King a Long Life*, 1830. He was one of the first English musicians to recognize the genius of Mendelssohn.

Attwood, THOMAS (1783–1856). English reformer. Born at Halesowen, Worcs., Oct. 6, 1783, he was educated there and at Wolverhampton. Settling in Birmingham, he was chosen to represent that city in London in the demand for more industrial freedom. In 1815 he made public the theory of inconvertible paper currency to which he devoted his life. The Birmingham Political Union, founded by Attwood in 1830, fought keenly for the first Reform Bill, on the passing of which, in 1832, Attwood was almost a popular hero. He died at Malvern, March 6, 1856.

Attwood's Machine. Device for verifying by experiment the velocities and accelerations of falling bodies, invented by George Atwood (1746–1807). It consists of a light pulley of aluminium, balanced very truly on its axis, and supported on a set of anti-friction wheels to reduce friction. A cord passes over it and carries two equal weights, one of which passes in front of a graduated vertical scale. At the top of the scale is a hinged platform, which holds up one of the weights and is released electrically by a second-beating clock. Attached to the vertical scale are two movable platforms, the lower of which will bring the descending weight to rest; the upper is ring-shaped and can detach small weights—consisting of brass slips—placed on the top of the main



Atwood's Machine. (a) Pendulum beating seconds. (b) Anti-friction gear. (c) Upper platform. (d) Stop platform

platform is now automatically detached, and the weight moves on with constant speed until it reaches the lower platform. This constant speed can be calculated by means of a stop-watch, and thus the acceleration due to the brass slip may be measured. From this it is easy to deduce the acceleration of a body falling freely (g), but there are many causes of error in Atwood's machine, and more reliable determinations of g are obtained from pendulum experiments. See *Gravitation*.

Atys or **ATTIS**. In Greek mythology, a shepherd beloved by Cybele, the Great Mother of the Gods. Driven mad by her in revenge for his amour with a nymph, he mutilated himself and died. Atys was originally a Syrian divinity, and the myth, like that of Adonis, symbolises the death of vegetation in winter and its revival in spring. His cult early made its way into Greece and was introduced into Rome with that of Cybele. Consult *Adonis Attis*, Osiris, J. G. Frazer, 1906.

Aubade (Fr. *aube*, dawn). In music, a song of awakening or morning serenade; an instrumental piece of similar style.

Aubagne. Town of France, in the dept. of Bouches-du-Rhône. It stands on the Huveaune, 10 m. by rly. E. of Marseilles. It has leather, pottery, earthenware, and cloth manufactures, and around it are vineyards and orchards.

Aubaine, DROIT D'. An obsolete French law. An *aubain* was a stranger, an unnaturalised resident in the land, and the *droit* was the right of the king to any property he might leave. It was the law from the early days of the monarchy, was repealed in 1790, revived by Napoleon, and abolished in 1819.

weights, but too long to pass through the ring platform.

The brass slip, when placed on one of the main weights, makes that side heavier and causes it to descend with a uniform acceleration; thus, when this weight reaches the upper platform, it has attained a certain velocity.

The brass slip is now automatically detached, and the weight moves on with constant speed until it reaches the lower platform. This constant speed can be calculated by means of a stop-watch, and thus the acceleration due to the brass slip may be measured. From this it is easy to deduce the acceleration of a body falling freely (g), but there are many causes of error in Atwood's machine, and more reliable determinations of g are obtained from pendulum experiments. See *Gravitation*.

Aube. River of France. Rising on the plateau of Langres, it flows W. to the Seine near Romilly. Its length is about 150 m.

Aube. Department of France. In the N.E. of the country, it is an agricultural district watered by the Seine and the Aube. Much of it is sterile soil, but the vine, vegetables, wheat, and other cereals are grown. Fruit is cultivated and cattle and horses are reared. Troyes is the capital. Area about 2,326 sq. m. Pop. 239,563.

Aub pine OR **ANISIC ALDE YBIE** (Latin *alba spina*, white thorn). Artificial perfume with the odour of hawthorn. See *Perfumery*.

Auber, DANIEL FRANÇOIS ESPRIT (1782–1871). French composer. Born Jan. 29, 1782, at Caen,



D. F. E. Auber, French composer

he succeeded Cherubini as director of the Paris Conservatoire in 1842, and was appointed imperial *maître-de-chapelle* in 1857. Of his operas, nearly 50 in all, the best known are *La Muette de Portici*, generally familiar as *Masaniello*, 1828; *Fra Diavolo*, 1830; *Le Domino Noir*, 1837; *Zanetta*, 1840; *Les Diamants de la Couronne*, 1841; *La Sirene*, 1844. He died in Paris, May 13, 1871.

Aubergine. Plant of the family Solanaceae. It is a half-hardy annual growing to a height of 2 ft.–3 ft., with blue flowers and white or purple fruit shaped like an egg, whence its familiar name egg-plant. It prefers light rich soil and sunny positions, but may be grown as a greenhouse plant. The so-called eggs are edible, and while in India they are curried, in England they are prepared by cutting off the ends, removing the centre or seeds of the fruit, and replacing it with chopped seasoned meat. The fruits are then either fried or cooked in a casserole.



Aubergine, showing fruit

Aubervilliers. Town of France, in the dept. of Seine. It lies near the river Seine and on the canal St. Denis, and is a N.E. suburb of Paris. It manufactures chemicals, fertilisers, glass, rubber, and perfumes. In the Middle Ages it was the resort of pilgrims. Pop. 55,871

Aubigné, JEAN HENRI MERLE D' (1794-1872). Swiss ecclesiastical historian. Of Huguenot stock, he was born at Eaux-Vives, near Geneva, Aug. 16, 1794, and studied at Geneva and Berlin. In 1818 he was appointed pastor of the French Protestant Church at Hamburg, and in 1823 became court preacher at Brussels. He returned to Geneva in 1831 to assist in the foundation of the new Evangelical Church and to occupy the chair of church history in its theological college. The rest of his life was spent at Geneva, where he died Oct. 21, 1872. His most popular work was the *History of the Reformation in the 16th Century*, 1835-53.

Aubigné, THEODORE AGRIPPA D' (1552-1630). French historian, soldier, and poet. Of noble Huguenot



T. A. d'Aubigné
French author

family, he was born Feb. 8, 1552, near Pons, in Saintonge. At Geneva he studied under Beza. In 1567, eager to serve the Protestant cause, he enlisted under Condé, and rendered distinguished services to Henry IV. The last years of his life he spent in exile at Geneva, pursuing his studies and superintending the fortifications of Berne and of Basel. He died April 29, 1630. He wrote a realistic novel, *The Adventures of Baron de Foranesté*, 1617, and some satirical poems depicting the horrors of war—*Les Tragiques*, 1616. But he is best known by his *Universal History* from 1550-1601 (1616-1620), the third volume of which was so outspoken that it was burnt by the common hangman in Paris.

Aubin. Town of France, in the dept. of Aveyron. It stands on the Enne, 25 m. N.W. of Rodez. Its chief industries are connected with the mining of coal and iron.

Aubrey, JOHN (1626-97). English antiquary. Born at Easton Pierse, Wiltshire, March 12, 1626, he was educated at Blandford Grammar School and Trinity College, Oxford. He described the stone circle at Avebury, 1649, but his voluminous notes upon the antiquities of Surrey and Wiltshire were not utilised until 1718 and 1847. He published his *Miscellanies* in 1696, and furnished *Minutes of Lives for the Athenae Oxonienses* of Anthony à Wood. Dying at Oxford, he was buried in the church of S. Mary Magdalene.

Aubrietia. Genus of annual and perennial herbs of the family Cruciferae. Native to S. Europe, it is much grown in English rock-gardens, flowering May-June.

Aubry de Montdidier. French courtier in the episode of the "dog of Montargis." According to the story, Aubry was murdered by Macaire in the forest of Bondy, near Paris. Suspicion being aroused by the ferocity of Aubry's dog towards Macaire, a judicial combat between the dog and Macaire was held. The dog was victorious, and Macaire confessed and was condemned to death. The scene is usually laid in 14th century Paris, Macaire being represented with a large club, and sometimes buried to the waist. In some accounts the dog has a cask for shelter.

The dog came to be known as the "dog of Montargis" from the 15th century picture of the duel in the château at Montargis. The story occurs as early as the 12th century, Macaire being the title of a *chanson de geste*, or epic chronicle, in which in the time of Charlemagne a dog detects his master's murderer. A similar story is found in Plutarch.

Auburn or LISSEX. Village in co. Westmeath, Eire, 7 m. N.E. of Athlone. The name is derived from the popular association of Lissoy with the "sweet Auburn" of Goldsmith's poem, *The Deserted Village*.

Auburn. City of Maine, U.S.A., the co. seat of Androscoggin co. It stands on the Androscoggin river, which supplies it with water-power, 34 m. N. of Portland, on the Grand Trunk and Maine Central rlys. It has manufactures of boots and shoes, cotton goods, and furniture. Settled in 1786, it became a town in 1842. Pop. 19,817.

Auburn. City of New York, U.S.A., the co. seat of Cayuga co. It is 24 m. W.S.W. of Syracuse, on the New York Central and other rlys., and has important manufactures of woollens, cottons, twine, and farming implements. It has a state prison, which adopts the Auburn or silent system of treatment, an asylum, a theological seminary founded 1818, and a state armoury. Water-power is supplied by Lake Owasco, situated a little to the S., on an outlet of which the city stands. Pop. 35,763.

Aubusson. Town of France, in the dept. of Creuse. It stands on the river Creuse, 24 m. by rly. S.E. of Guéret, and is noted for its manufacture of carpets, an industry at least 400 years old, but now suspended. Earlier still it was the chief town of a viscounty.

Aubusson, PIERRE D' (1423-1503). The grand master of the Knights Hospitallers of S. John of



Pierre d'Aubusson,
defender of Rhodes

Jerusalem and defender of Rhodes. Born of a noble French family, after distinguished military service he became grand master of the Knights of Rhodes, 1476.

In May, 1480, after two months' siege, he inflicted a crushing defeat on the Turks and drove them from Rhodes. His policy was to create an alliance of the Christian nations against the Turks, and in 1501 he was appointed commander-in-chief of a great army which was to be raised by the pope and the sovereigns of Spain, Castile, Portugal, Hungary, and France, but in fact was not. He was known as the shield of the church.

Aucassin and Nicolette. 12th or 13th century French romance, named after its hero and heroine. Written in alternate prose and verse, it is one of the most celebrated of the old French *fabliaux*. It tells of the love of Aucassin, son of a count of Provence, for the supposedly humble Nicolette. The story, which is the theme of an opera by Grétry (1779), has been translated into English by Andrew Lang, 1887; L. Housman, 1902; F. W. Bourdillon, rev. ed. 1919.

Auch. City of France, capital of the dept. of Gers. It is picturesquely placed on a hill and along both banks of the river Gers, 55 m. by rly. W. of Toulouse. The seat of an archbishop, its chief buildings are the magnificent Gothic cathedral and the episcopal palace. It manufactures cotton and woollen goods, and trades in wine and fruit. Auch, a very old city, takes its name from a Celtic tribe, the Ausci. It was an important place under the Romans, and in the Middle Ages was the capital of Armagnac and later of Gascony.

Auchinleck. Town of Ayrshire, Scotland. It stands $4\frac{1}{2}$ m. S.E. of Mauchline on the railway, in a rich coal district. Auchinleck House was the ancestral home of the Boswells, lairds of Auchinleck, one of whom (buried here) was James Boswell, the biographer of Johnson. Sir Alexander Boswell established in 1815 the Auchinleck Press for printing rare works in early Scottish and English literature. The Auchinleck MS., consisting of old English poetry, was

presented by Alexander Boswell to the Faculty of Advocates, and is in their library at Edinburgh. Pop. of parish, including Lugal district, 6,626. *Pron. Affleck.*

Auchinleck, SIR CLAUDE JOHN EYRE (b. 1884). British soldier.

Son of Col. John Claude Auchinleck he was born at Aldershot and educated at Wellington. From Sandhurst he was commissioned in the 62nd Punjabis and served with distinction in Egypt, Aden, and Mesopotamia, 1914-19. He was awarded the D.S.O., Croix de Guerre, and O.B.E.; and promoted to brevet colonel. He received the C.B. in 1933 and C.S.I. in 1935 for campaigns against the Upper Mohmands. Instructor at the staff college, Quetta, 1930-33, and commander of the Peshawar brigade, 1933-36, he became deputy chief of staff, Indian army headquarters, 1936-38, and commander of Meerut district, 1938.

Gen. Auchinleck returned to England early in 1940 and was appointed a corps commander. When Germany invaded Norway he was placed in command of the Allied forces at Narvik, organizing the subsequent withdrawal in June. Returning to India in Dec. as C.-in-C., in March, 1941, he drew up plans for a man-power survey of India to include all areas and classes, and raised four new Indian regiments. On July 2 he succeeded Sir Archibald Wavell as C.-in-C. of the new Middle East Command. Like his predecessor, Auchinleck failed to defeat Rommel, but he did much to build up the desert army that finally drove the Axis out of Africa. Despite difficulties of supply and communications, he reorganized the whole fabric of the army and improved cooperation between the various arms—tanks, artillery, and infantry. He initiated the system of using transporters to carry tanks to the front line, and overhauled the organization for recovering and repairing armour disabled on the battlefield. He also founded the Desert Commandos, or Jock Columns (*q.v.*), which ranged the desert and did much damage in the enemy's rear.

Upon the British withdrawal from Sollum and Sidi Omar, Auchinleck assumed personal command of the 8th army and moved

his headquarters from Cairo to the desert. But he had neither sufficient troops nor enough heavy armour and artillery to stop Rommel and was therefore forced to retreat to Egypt.

At the time Auchinleck was severely criticised for his retreats: but later authorities on strategy inclined to the view that his conduct had no alternative, in face of an enemy superior in manpower and equipment and operating over shorter lines of communication. Had the Germans made a successful landing in Syria and spread east, the whole defence of the desert would have collapsed, and the Middle East might have been lost. By keeping the 8th army intact Auchinleck saved a nucleus for the fighting force that later was built up for the counter-attack at Alamein and the clearance of Egypt. As one authority declared, Auchinleck lost Tobruk, but later events proved he had saved Egypt.

During 1943-47 he was again c.-in-c. India and, under the defence council, supreme cmdr. in India and Pakistan. Knighted 1945, he became F.-M. next year.

Auchmuty, SIR SAMUEL (1756-1822). British soldier. Born in New York, of Scottish descent, he joined the British army in the War of Independence. On the conclusion of peace he came to England, and in 1783 exchanged into a regiment about to proceed to India, where he distinguished himself at the siege of Seringapatam, 1792. He played a conspicuous part in Egypt in 1800-3, in Baird's famous march across the desert and the passage down the R. Nile, and in the disastrous Buenos Aires expedition of 1806. He served also in India and Java and was knighted on his retirement in 1815. He died suddenly in Phoenix Park, Dublin, Aug. 11, 1822.



F.M. Auchinleck,
British soldier

Auckland. Province of New Zealand. It occupies the N. part and nearly half of North Island is about 370 m. long and 185 m. broad, and covers an area of 25,400 sq. m. Its surface is hilly and well wooded, and its coastline measures 1,200 m. It is watered mainly by the Waikato and Waioira rivers which, with the rly. system, the highways, and the air lines, afford means of inland communication. The thermal district about Rotorua and Taupo contains hot springs and geysers and a number of mud volcanoes. It is a popular tourist resort as well as the site of a Government sanatorium. Noted for dairy products, timber, and kauri gum, the province produces also maize, potatoes, New Zealand flax, grapes, oranges, and other fruit. It engages largely in sheep and stock raising and dairy farming, and has important gold mines in or near the Thames valley. Auckland is the capital. The pop. of the prov. was estimated in 1948 at 698,056, of whom 80,326 were Maoris.

Auckland. Largest city of New Zealand. On North Island, the capital of the province of Auckland and formerly of the dominion, it is on the S. side of Waitemata harbour and only about 6 m. from Manukau harbour on the opposite coast of the island. The former harbour, accessible at low tide to the largest vessels, has two graving-docks, the Calliope and the Auckland, two patent slips, and ample wharf accommodation. The Calliope dock is the largest in Australasia. Auckland stands on an isthmus of volcanic formation. A great yachting centre, it is connected by rly.,



Arms of
Auckland, N.Z.



Auckland. View of this important New Zealand city looking towards the entrance to the harbour

Courtesy of the High Commissioner of New Zealand

highway, and air line with Wellington, and is the dominion's terminal for overseas air services. The seat of a bishop, it has Anglican and R.C. cathedrals; also an art gallery, a fine museum, and a free library; also among educational institutions a university college with 17 professors, and schools for the blind and the deaf. Albert Park is the chief open space in 15 sq. m. of parks. Queen Street contains great public buildings.

The industries include shipbuilding, sugar refining, and the manufacture of paper, glass, bricks, and rope. There is a large trade in timber; and butter, cheese, meat, kauri gum, wood, coal, and gold are exported. Founded in 1840 by Governor Hobson, the city was named after the earl of Auckland (1784-1849), then governor-general of India. Wellington superseded it as the seat of government in 1865. The pop. of the urban area in 1945 was 263,575.

Auckland Islands. Volcanic group of uninhabited islands in the S. Pacific. Situated 200 m. S. of New Zealand, to which they politically belong, they have an area of 234 sq. m., the largest, Auckland Island, being 27 m. long and 15 m. broad. They have a number of good natural harbours, Port Ross on the N. coast of Auckland Island being one of the best. On this island the New Zealand Government maintains a provision and clothing depot for the use of shipwrecked mariners. The islands were discovered in 1806 by Captain Bristow, and proclaimed within the jurisdiction of New Zealand in 1863.

Auction Bridge. Card game for four players, the child of bridge and the parent of contract bridge, which largely superseded it. Originating in India about 1903, it was made the subject of laws by the Portland and Bath Clubs in 1909, and during the 1920s was among the most popular card games in Great Britain. See Bridge.

Auctioneer. One licensed to sell property by public auction. In England an auctioneer pays £10 a year for his licence, which is renewable every July 5; no licence is required for selling under an order of the court, or for fish when landed. An auctioneer is responsible to his client, and is liable for negligence in the custody of goods or misrepresentations in particulars of sale. When selling he must show a notice with his name and address.

Auctioneering (Latin *auctio*, increase). System of selling property of all kinds by offering it to

the competition of prospective purchasers, who are encouraged to bid against one another until no higher offer is made or the reserved price is reached.

In the case of real estate, land, houses, leases, shares, mining or fishing rights, etc., particulars are printed and distributed beforehand, together with the "conditions of sale." The signing of the memorandum of sale accompanying this paper by purchaser and auctioneer constitutes a legal binding sale. A bid may be withdrawn any time before the fall of the hammer. Usually the auctioneer receives the full purchase money only for chattels; in other cases he takes a deposit as settled by the "conditions," generally 10 p.c. on the price. For an account of this he is responsible to the vendor. If the purchase be not completed by the bidder the latter forfeits his right to the money. The auctioneer cannot buy for himself "under his own hammer," nor may he bid, unless such right is expressly reserved in the conditions of sale, when he can bid either for the owner or for an absent or present buyer. The vendor may bid if this right is reserved.

In the case of goods, chattels, and portable property, the auctioneer receives the full purchase money, the buyer paying a deposit during the sale and completing his purchase before receiving the goods. Articles such as jewelry rare books, etc., are often sold for "cash," when the buyer pays down the full price and is at once handed the article. In all cases a vendor may fix a reserved, or an "upset" price, below which he refuses to sell; but this fact must be expressly stated in the particulars of sale.

During the Second Great War a maximum price was fixed for most goods even at auctions. No higher bid could be accepted. If several persons bid this price it was necessary to decide the purchaser by drawing from a hat.

A mock auction is a sale by persons who illegally act together to make the public believe it a genuine auction, and by "puffing," etc., obtain higher prices than the articles are worth. A "knock-out," which is now illegal, is an arrangement by a number of buyers who depute one to bid, and afterwards privately dispose of the property among themselves. Auctions have been held by the running of a sandglass, or "by candle," when the last bidder before the

small piece of lighted candle goes out becomes the purchaser. Scottish auctions are called "roups," and the vendor is the "exposer," and upset prices are usual. Auctions were known in Babylon and practised by the Romans.

Auctioneers' Institute. Senior and largest professional society representing auctioneers and estate agents in Great Britain. Founded in 1886, it has 6,500 members, with headquarters at 29, Lincoln's Inn Fields, London, W.C. 2. Members undertake valuations for any purposes; sales by auction or private treaty and the letting and management of all kinds of property; and agricultural valuations, sales, lettings, and management. Fellows and Associates are entitled to use the letters F.A.I. and A.A.I. respectively. The Institute publishes a monthly journal; has a library, appointments bureau, and benevolent fund; and arranges regular meetings for the discussion of subjects affecting the profession. It has established auction marts in London, Liverpool, Manchester, Newcastle-upon-Tyne, and Belfast, at which only members of the Institute may sell. There are 25 branches in the U.K. The Institute founded the College of Estate Management in 1919.

Aucuba Japonica. Evergreen shrub of the family Cornaceae, a native of Japan.



Aucuba Japonica
garden shrub

The large elliptical leaves are of a leathery texture, pale green in colour, variously spotted and blotched with yellow. The inconspicuous flowers have petals and sepals in fours, some bearing pistils only, others stamens only. These two

forms of flowers are borne on separate plants; only those with pistillate flowers bear the red berries.

Audacious. British battleship, the 27th Dreadnought added to the British fleet. Launched in 1912, she displaced 23,000 tons, and had a speed of 21.5 knots. On Oct. 27, 1914, the Audacious was sunk off the N. coast of Ireland by enemy mines. Her loss was not officially admitted until the end of 1918.

Aude. River of France. Rising in the Pyrenees, it flows 130 m. N. and E. through the dept. of Aude

to the Golfe du Lion near Narbonne. Its tributaries include the Fresquel and the Cesse, and the Canal du Midi is alongside the river E. of Carcassonne.

Aude. Department of France. Formerly part of the old prov. of Languedoc, it is bordered E. by the Mediterranean and has an area of 2,448 sq. m. Comprising mainly the valley of the Aude, the S. contains the slopes of the Pyrenees. From Carcassonne westwards a lowland gap, the gate of Toulouse, followed by the Canal du Midi, separates these hills from the S.W. corner of the Cévennes. The coast line is flat and marked by a number of lagoons. Aude is noted for its wine, corn, fruit, and honey; slate and marble quarrying are engaged in. Carcassonne is the capital. Pop. 285,115.

Auden, WYSTAN HUGH (b. 1907). English poet. The son of G. A. Auden, distinguished physician and antiquarian, he graduated from Christ Church, Oxford, where he was an exhibitioner. He became associate professor of English literature at Ann Arbor university,



W. H. Auden.
English poet

Michigan, and held the Guggenheim research fellowship in 1942. Later he was professor of English literature at Swarthmore university, Pa., and was awarded the American Academy of Arts and Letters prize in 1945. An outstanding figure in the poetry of the 1930s, he published *Poems* in 1930, and followed it with *The Orators*, 1932, and *The Dance of Death*, 1933. He collaborated with Christopher Isherwood (*q.v.*) in three remarkable poetic plays, *The Dog Beneath the Skin*, 1935; *The Ascent of F.6*, 1937; *On the Frontier*, 1938; and in a travel book, *Journey to a War*, 1939, the war being the China-Japan conflict. Auden collaborated with Louis MacNeice (*q.v.*) in *Letters from Iceland*, 1937. Later works include *Another Tune*, 1940; *For the Time Being*, 1945; and *The Age of Anxiety*, a Baroque Eclogue, 1948, a philosophical conversation in verse.

Audenshaw. Urban district and parish of Lancashire, England. It is 5 m. E. of Manchester, has engineering works and cotton mills, and makes hats. The church of S. Stephen is Early English. Pop. 8,460. See Manchester.

Audhumla. A cow in Norse mythology. She lived upon salt rime-stones, and the giant Ymir, the first being in human shape, fed upon her milk. The first day she licked the stones a man's hair appeared, the second a man's head, and the third his whole body. He was Buri, whose son was Bor, father of Odin (*q.v.*).

Audiometer. Apparatus for measuring sound, or giving a visual indication of sound waves; also similar apparatus for testing hearing. The electrical inventor David Edward Hughes gave the name audiometer in 1879 to a device for obtaining a balance of induction between two coils, in conjunction with a third coil; he used a telephone receiver as the detector. The modern audiometer, in one form, is an appliance for obtaining an indication of the amplitude, etc., of a sound wave. A thermionic oscillator valve is used to produce the desired sound, which is fed into a microphone, the shape of the wave being delineated on an oscillograph (*q.v.*). By another type of apparatus it is possible to test the hearing of a subject. The sound is fed to a telephone receiver applied to the ear, and the intensity varied by means of a calibrated attenuator, which indicates the minimum intensity at which the subject can perceive the sound. By substituting a gramophone with a suitable record for the valve oscillator, a group of subjects can be tested, by supplying them with headphones connected to the reproducing appliance. Audiometers are used also for testing the acoustics of a building such as a concert hall.

Audit (Lat. *auditus*, a hearing). In early times, a hearing of complaints or a judicial inquiry; later, an examination of accounts, at first chiefly oral, which gradually became almost entirely documentary. Today an audit is specially the annual examination of the accounts of a company, society, or other undertaking by a person or persons appointed for the purpose. The periodical payment of rent and settlement of accounts between landlord and tenant is also known as an audit, in many cases celebrated by a dinner or festivity (hence the strong "audit ale" brewed for audit-day feasts at colleges at Oxford and Cambridge). In the United Kingdom the public accounts are audited by officials under the comptroller and auditor-general, and his department is sometimes known as the audit office. It developed from the

audit board of five commissioners established in 1785.

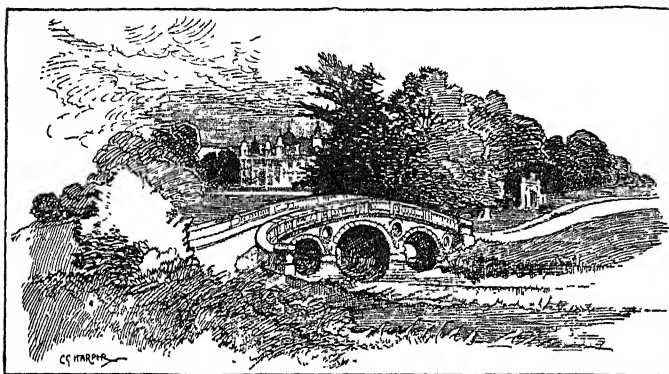
Auditor (Lat., hearer). In English law, a person whose duty is to examine the accounts of a company, firm, or person. An auditor is liable for negligence if he fails in his duty. Under the Companies Acts every limited liability company is bound to have an auditor, appointed by the shareholders. This auditor must examine the company's books and report thereon annually to the shareholders, and must, in such report, state whether in his opinion the balance-sheet is a proper one and exhibits a full and fair account of the company's position. Such an auditor is bound to examine the books and vouchers of the company. Building societies, friendly societies, industrial societies, various public bodies, such as municipal corporations, county and district councils, and the like, are also bound to have auditors. See Accountancy.

Auditory Nerve. Nerve which springs by two roots from the brain and passes through an aperture in the skull termed the internal auditory meatus. Its function is to supply the internal structures of the ear. See Brain; Ear. Nervous System.

Audley. Urban district of Staffordshire, England. It is 4 m. N.W. of Newcastle-under-Lyme, on the railway, and has a mining industry. Pop. 13,619.

Audley, BARON. English title, created 1313, therefor among the oldest peerages in the U.K. The 23rd baron, Thomas Percy Henry Touchet-Tuchet-Jesson, was born Sept. 15, 1913, and succeeded to the title in 1942.

Audley of WALDEN, THOMAS AUDLEY, BARON (1488-1544). English lord chancellor. He studied at Cambridge and the Inner Temple, was elected to Parliament 1523, and in 1529 was chosen speaker of the house of commons. In 1532 he was knighted and made keeper of the great seal, being appointed lord chancellor the following year. He supported Henry VIII's divorce from Catherine of Aragon and marriage to Anne Boleyn, presided at the trials of Bishop Fisher and Sir Thomas More, and tried Anne Boleyn in 1536. In 1538 he was created Baron Audley of Walden. In 1540 he carried through Parliament the attainder of Thomas Cromwell, earl of Essex, and the divorce of Anne of Cleves. He rebuilt Buckingham College, Cambridge, and changed its name to Magdalene 1542. He died April 30, 1544.



Audley End, near Saffron Walden, Essex. The mansion, built on the site of a 12th century Benedictine priory, is the seat of Lord Braybrooke

From a drawing by C. G. Harper

Audley, SIR JAMES (d. 1386). English soldier, one of the knights of the Order of the Garter on its institution in 1344. Bravery at Poitiers in 1356 brought him special reward from the Black Prince. In 1367 he was governor of Aquitaine and in 1369 great seneschal of Poitou.

Audley End. Hamlet of Essex, England, 1½ m. S.W. of Saffron Walden. Here is Audley End, seat of Lord Braybrooke, ascribed to John Thorpe in the 17th cent., and from 1948 National Trust property.

Audoux, MARGUERITE (c. 1880-1937) French novelist. In 1910 she published *Marie Claire*, the autobiography of a poor provincial girl, which won the Femina Vie Heureuse prize, and was translated into English by J. N. Raphael, as was *Valserine*, 1912. She died Feb. 3, 1937.

Audran, EDMOND (1842-1901). French composer. Born at Lyons, his earliest dramatic composition was *L'Ours et le Pacha*. Later he found his vocation in comic opera, starting in 1879 in Paris with *Les Noces d'Olivette*, which had a successful run at the Strand Theatre, London, as *Olivette*, and was followed by *The Grand Mogul*, *La Mascotte*, *La Cigale*, and *La Poupée*. He died Aug. 16, 1901.

Audran, GÉRARD (1640-1703). French engraver. Born at Lyons, Aug. 2, 1640, he studied at Paris and Rome, engraved after Raphael, Nicholas Poussin, Annibale Caracci, Domenichino, and other painters, but was at his best in translating the works of Le Brun. He died in Paris, July 26, 1703.

Audubon, JOHN JAMES (c. 1780-1851). An American ornithologist. Born at Mandeville, Louisiana, he became a planter in Pennsylvania. He explored the forests in search of birds, his art training enabling

him to make valuable drawings.

His *Birds of America*, 1827-38, made his reputation. His later years were devoted to a study of the mammals of America. He died at New York, Jan. 27, 1851. *Consult*

Audubon and His Journals, M. R. Audubon, 1898; *Life and Times*, F. H. Herrick, 1938.

Aue. Town of Saxony. At the junction of the rivers Mulde and Schwarzwasser, 20 m. by rly. S.W. of Chemnitz, it manufactures cotton, lace, linen, machinery, tin, and furniture, and has technical schools. Pop. 24,702.

Auerbach, BERTHOLD (1812-82). German novelist. Born Feb. 28, 1812, of Jewish parentage, at



Berthold Auerbach, German novelist

by his *Schwarzwälder Dorfgeschichten*, *Village Tales of the Black Forest*, 1843-6, that Auerbach became most widely popular. Later he returned to the philosophical and didactic novel with *Auf der Höhe*, 1865, Eng. trans. F. E. Bunnnett, 1867; and *Das Landhaus am Rhein*, 1869, Eng. translation *The Country House on the Rhine*, 1870. His best work is in stories of simple people, such as *Edelweiss*. He died at Cannes, Feb. 8, 1882.



J. J. Audubon ornithologist

Auersperg, ANTON ALEXANDER. COUNT VON (1806-76). Austrian poet and politician. Born at Laidach, April 11, 1806, he was educated at Graz and Vienna. His opposition to the rigour of the Austrian government brought him into prominence. He attended the Frankfort parliament of 1848, and from 1860 was a member of the Austrian Reichsrat. He died at Graz, Sept. 12, 1876. Under the pseudonym of Anastasius Grun, Auersperg wrote many poems inspired by liberal ideas.

Auerstädt. Village in Saxony 25 m. from Weimar. It was the scene of the victory of the French with a single corps under Davout over the Prussians, Oct. 14, 1806. Napoleon, advancing towards Jena, ordered Davout to close up with the main army. While crossing the Saale at Kosen, Davout came into touch with a body of Prussians, under Charles, duke of Brunswick, whom he attacked although greatly outnumbered, about 30,000 men against 50,000. In a few hours both sides had suffered severely, but the Prussians had reserves available, while the French had none, although Bernadotte's corps was not far away. Brunswick, however, had been fatally wounded, and, as rumours of the disaster at Jena were being circulated, the commander of the Prussian reserves declined to advance and a retreat was ordered. The French lost about 7,000, the Prussians perhaps double that number. Davout was made duke of Auerstädt. *See* Jena, *Battle of*.

Aufidena. Ancient city of Italy, in the prov. of Aquila, dept. of Abruzzi and Molise. Situated just N. of the modern Alfidena, the city was built on two hills, the walls, of rough Cyclopean work, being more than a mile in circumference. Some 1,400 tombs of the advanced Iron Age have been examined in the necropolis below the town. Alfidena was captured by Allied troops on Nov. 23, 1943, after its destruction by Germans defending the central sector of the Italian front.

Aufidius, TULLUS. Semi-legendary leader of the Volscians against the Romans. A wealthy man of Antium, he "had the respect and privilege of a king," according to Dryden's translation of Plutarch's *Lives*. When the Roman general Coriolanus sought revenge on Rome for ingratitude, Aufidius made alliance with him. In Shakespeare's *Coriolanus*, Aufidius joins the hero against Rome, and then causes his murder.

Augean Stables. In Greek legend, stables belonging to Augeas a king in Elis. One of the twelve labours imposed on Hercules was the cleansing of these stables, which contained stalls for 3,000 oxen. He accomplished his task in one night by turning through them the rivers Alpheus and Peneus. As a reward Augeas had promised Hercules 300 oxen, and on his refusal to keep his word he was slain by Hercules. The phrase Augean stables is used in political language for a hotbed of corruption. See Hercules.

Augengneiss (Ger., eye-gneiss) Gneiss in which certain crystals, e.g. those of felspar, garnet, etc., are larger than the other components of the rock. These crystals, owing to the shearing that the rock has undergone, have assumed a lenticular or eye-shaped outline.

Augereau, PIERRE FRANÇOIS CHARLES DUKE OF CASTIGLIONE (1757-1816) French soldier. Born in Paris, Nov. 11, 1757, the son of a frunterer, he joined the French Revolutionary army in 1792. He distinguished himself at Lodi, Roveredo, and in other battles of Napoleon's Italian campaign, particularly at Castiglione. In 1804 he was made a marshal and rendered valuable service at Jena and elsewhere. At the restoration of the Bourbons in 1814 he made his peace with Louis XVIII. When Napoleon escaped from Elba in 1815 he endeavoured in vain to join his old master. He died June 12, 1816.

Aughrim, BATTLE OF Fought July 12, 1691, between the English and the Irish. It takes its name from a ruined castle about 4 m. S.W. of Ballinasloe, in co. Galway. The Irish, about 20,000 strong, under a French general, Saint Ruth, were in position at Aughrim; the English, under Ginkel, marched from Athlone to attack them.

The position of the Irish was well defended by a bog and a breastwork, against which the English advanced several times without success. Just before nightfall the English horsemen found a path across the bog, and turned the Irish flank. Saint Ruth was killed, and, encouraged by the success of the horsemen, the English infantry again assailed the breastwork, this time successfully. The defeat soon became a rout, covered by Sarsfield, who was leading the cavalry. Galway was taken by Ginkel and soon Limerick alone remained a refuge for the supporters of James II. The Irish lost from 4,000 to 7,000 men. Out of 25,000 men the English lost under 2,000.

Augier, GUILLAUME VICTOR ÉMILE (1820-89). French dramatist, one of the founders of the modern realistic comedy of manners.



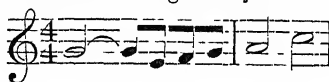
Augier

Born at Valence, Sept. 17, 1820, he began by writing plays in verse of the older classical type (e.g. *La Cigüe*), but soon passed to the prose drama of modern life with *Le Gendre de M. Poirier* (in collaboration with Sandeau), 1854, followed by *Les Effrontés*, 1861, *Maitre Guérin*, 1864, *Les Fourchambault*, 1878, and many others. His plays are noteworthy for their characterisation, robust morality, and satire on society. He died at Croissy, Oct. 25, 1889.

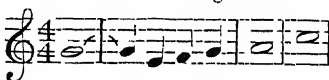
Augite (Gr. *augê*, lustre). In geology, the commonest member of the monoclinic pyroxene group. It is a calcium, iron, magnesia, aluminium silicate, and as a rock-forming mineral enters largely into the composition of basalts and other lavas, gabbros, and dolerites. Generally black when in large crystals, it exhibits various shades of yellow or brown when in thin splinters or sections. See *Pyroxene*.

Augmentation (Lat. *augmentum*, increase). Addition to armorial insignia granted specially by royal licence. Such additions may be placed in small shields, as in the cases of the dukes of Marlborough and Wellington, in cantons or chiefs, or may merely be extra charges—a crest or supporters. In blazoning arms these are always described last, “and for augmentation” being prefixed. See *Coat of Arms*.

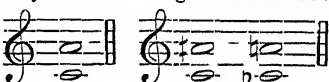
Augmentation. In music (1) the presentation of a musical theme or motive in notes of greater value; a device used chiefly in fugal movements. Fugue subject:



etc. The same augmented:



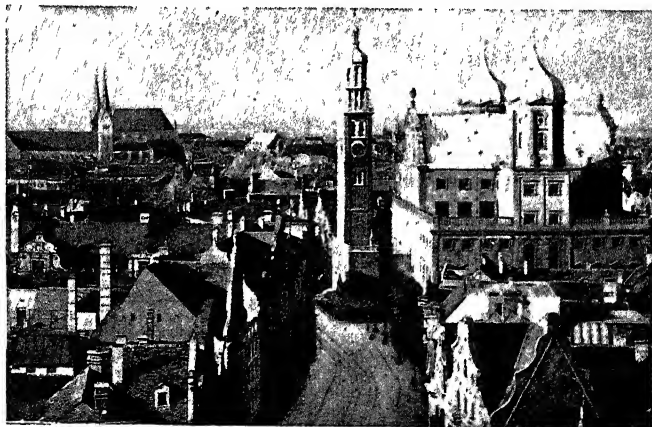
etc.; (2) the increasing of a major or perfect interval by a semitone, through raising its upper note or through flattening its lower note; e.g. Major sixth. Augmented sixths:



See *Interval*.

Augmentations, COURT OF. An English court of law established by Henry VIII in 1536, after the dissolution of the monasteries. Its function was to hear cases arising out of the disposal of monastic lands, the object being to augment the revenues of the crown. Its records were kept in the Augmentation Office, and it was dissolved in 1553.

Augsburg. City of Bavaria. Capital of the district of Swabia, it stands high, about 40 m. by rly. N.W. of Munich, and between the rivers Lech and Wertach. The seat of a bishop, and formerly one of the wealthiest of the free cities of Germany, it contains some interesting buildings. These include the cathedral, partly dating from the 10th century, the churches of S. Ulrich and S. Anna, the episcopal palace, now used as public offices, and the 17th century town hall, which was heavily damaged in the Second Great War.



Augsburg, Bavaria. General view (1939), showing the town hall on the right and the cathedral in the left background.

Other features are Maximilian Street, the main thoroughfare, and some fine old fountains. Around the old town are new suburbs with fine streets and modern buildings. Cotton, linen, and silk goods are made, and the main Messerschmitt aircraft works were here. Pop. 185,704.

Augsburg, the ancient Augusta Vindelicorum, was early occupied by the Vindelici, and was settled by the Romans before the opening of the Christian era, the name Vindelicum being later changed to Rhaetia. Its present name is a corruption of Augustburg, or the city of Augustus, which it received about 800. It owes its early importance and its later commercial prosperity, when part of Swabia, to its situation at the junction of several roads, much of the trade from Italy to the N. passing through it. Like Venice, it suffered from the discoveries and consequent changes in the trade routes of the world of the 15th and 16th centuries. It was a free city from 1276 to 1806, when it became part of Bavaria. During the 14th and 15th centuries it was the great money market of Europe. Its situation and wealth made it also a favourite place for diets and other meetings of importance, its prosperity being at its height during the Reformation period. The town was captured by the Swedes in 1632, and the league of 1686 against France was signed here. On April 17, 1942, R.A.F. Lancasters made a low-level attack in daylight on the M.A.N. Diesel-engine factory. The city was captured by Gen. Patch's U.S. 7th army on April 28, 1945.

Augsburg, CONFESSION OF. A statement of the Lutheran doctrine drawn up in 1530 and presented to Charles V during the diet of Augsburg. It was the work of Melancthon, was approved by Luther, and signed by all the original Protestant princes and by the representatives of Nuremberg and Reutlingen. It has been described as an *apologia* rather than a creed, for its earlier articles aimed at showing how close were the Lutheran doctrines to those of the Church of Rome. Its later sections dealt with the reformation of abuses.

Zwingli and his followers, regarding the Confession as unsatisfactory, issued a statement of their own faith, and leading Roman theologians also opposed it. Alterations were made in the various editions, one being known as the *variata* and another as the *Invariata*, but one or other re-

mained the authoritative statement of Lutheran faith throughout Germany. See Lutherans. Reformation.

Augsburg, LEAGUE OF. Coalition of European princes formed at Augsburg in 1686 against Louis XIV. Louis, who had just gained possession of Strasbourg and other parts of Alsace, also claimed part of the Palatinate, and the alliance was the reply. The members of the alliance included the emperor Leopold I, the king of Spain, the king of Sweden, and the Dutch republic. The elector of Bavaria, the dukes of Saxony and Savoy, and some Italian princes joined later, and secretly Pope Innocent XI promised support. In 1688 William of Orange became king of England and brought this country into the alliance which conducted against France the War of the League of Augsburg, 1688-97, ended by the treaty of Ryswick (*q.v.*).

Augur (Lat. *avis*, bird; *garrire*, to chatter). Member of a college of priests in ancient Rome. In late Republican times consisting of sixteen members, its functions included the inauguration of temples, priests, etc., and the taking of auspices from observations of the manner of flight and of the cries of certain birds before important public business. A report of unfavourable manifestations to the president of the assembly made it necessary to adjourn the meeting.

August. Eighth month of the Christian calendar, named after the Roman emperor Augustus. In the old Roman calendar it was the sixth month and originally called Sextilis. Augustus gave it his name because it had been his lucky month. To make it equal in length to July (named after Julius Caesar), he added a day from February. See Calendar.

Augusta. Name of several cities built by or in honour of the emperor Augustus and his successors: e.g. Augusta Caesarea, Saragossa; Augusta Taurinorum, Turin; and Augusta Allobrogum, Geneva.

Augusta. A city of Georgia, U.S.A., the co. seat of Richmond co. It stands on the Savannah river, at the head of navigation, 231 m. from its mouth, and is 132 m. N.W. of Savannah, on the Southern and other rlys. It is a popular winter resort. Its buildings include the Medical College, attached to the state university, and Richmond Academy, the oldest chartered school in Georgia. Augusta is the chief cotton manufacturing centre of the southern states, and one of the largest cotton markets.

Lumber, flour, silk, and cottonseed oil are produced. Founded in 1735, and named after the daughter of George II, it was captured by the British in 1779, 1780, and 1781. Pop. 65,919.

Augusta. Capital of Maine, U.S.A., and the co. seat of Kennebec co. It stands on the Kennebec river, at the head of navigation, 44 m. from its mouth, and is 62 m. by rly. N.E. of Portland. The Maine Central rly. crosses the river here, and steamers call from Boston and other large ports. The state house contains a large library; the city hall and the Lithgow Library are noteworthy. Lumber, cotton, pulp, and paper are produced. Pop. 19,360.

Augusta (or AGOSTA). Fortified seaport of Sicily, in Syracuse prov. It stands on an island connected with the mainland by a bridge, and is 19 m. by rly. N. of Syracuse. It has a spacious harbour, a fishing industry, and exports salt, oil, wine, and sardines. It was founded 1232 by the emperor Frederick II, and was devastated by earthquake in 1693 and 1848. Off here, in 1676, in a fight between the French and a Spanish-Dutch fleet, De Ruyter was killed. Pop. 17,000.

During the Second Great War Augusta became important as a base for Italian seaplanes and German U-boats. On July 12, 1943, after the Allied invasion of Sicily, a British and a Greek destroyer entered the port, to find it had been evacuated by the enemy. A German counter-attack on July 14 was beaten off.

Augusta. Name of two German empresses. Augusta (1811-90), wife of the emperor William I, was a daughter of Charles Frederick, grand duke of Saxe-Weimar. She was born and brought up at Weimar; in 1829 she married William, crown prince of Prussia, who in 1871 became German emperor. She was an intimate friend of Goethe. Augusta Victoria (1858-1920), wife of William II, was a princess of Schleswig-Holstein. She was born Oct. 22, 1858, and married in 1881. After the downfall of the empire Nov. 9, 1918, she retired to Doorn, in Holland, with the ex-Kaiser, and died there April 11, 1920.

Augustan Age. Name given to a period of literary excellence during the reign of the Roman emperor Augustus. The writers included Virgil, Horace, Ovid, Propertius, and Livy. The reigns of Anne in England and of Louis XIV in France have been also described thus. See Latin Literature.

Augustine (354-430). Father of the Church and bishop of Hippo Aurelius Augustinus. formerly

known in England as S. Austin and now more generally as S. Augustine, was born Nov. 13, 354, at Tagaste (modern Sùk Aghâs) in the prov. of Numidia, to the W of modern Tunis in N

Africa. His parents were Patricius, a pagan, and Monica, a Christian. both Latin-speaking citizens of the Roman empire. Augustine's education began at his native town and was continued at Madaura and Carthage. His ability marked him out for a professorship of the art of rhetoric, and he taught as such in Carthage, Rome, and Milan. After his conversion to Christianity in 386 he returned to his native land and went into a retreat, where he studied Scripture and philosophy. In 391 he was called against his will to be a presbyter, and in 395 to be bishop of Hippo Regius. In that place and office he remained until his death, Aug. 28, 430, preaching, teaching and writing.

Of Augustine's numerous works, the most interesting to moderns are two that take rank among the world's classics, the *Confessions* (*Confessiones*) in thirteen books, and the *City of God* (*De Civitate Dei*) in twenty-two books. In the *Confessions*, Augustine traces his progress from childhood to conversion. The last three books deal with the Book of Genesis. The *City of God* is an elaborate answer to the charge that the Christians were responsible for the fall of Rome in 410. This great work marks on the one hand the end of the ancient, and on the other hand the beginning of the medieval world.

Among other works of Augustine are his copious *Explanations of the Psalms* (*Enarrationes in Psalmos*) and his *Homilies* (*Tractatus*) on S. John's Gospel. His *Sermons*, of which some hundreds are preserved, are written in a popular style. His correspondence, represented by some 300 letters, is concerned entirely with scriptural and doctrinal questions. S. Augustine was a thinker rather than a scholar. He knew no Hebrew and comparatively little Greek, but knew where to go for information.

No writer ever more absolutely asserted the entire dependence of man on God. He is also strong on the practical side of religion, such

as almsgiving. He was an orthodox member of the Catholic Church, accepting the decrees of general councils as binding and infallible. He regards them as above the bishop of Rome, though he, as occupant of Peter's chair, is superior to any other bishop.

Augustine was the first to transform the authority of the Church into a factor in religion. He changed the current conception of piety into a deep and firm trust in God by faith. His doctrines are those of S. Paul reaffirmed and developed, and, after S. Paul, he has had the greatest influence on the theology of the West. In the 19th century Archbishop Trench of Dublin and Dom Odilo Rottmanner of Munich were probably the chief authorities on his works. Thirty-three hitherto unknown sermons of S. Augustine were discovered by the French monk, Dom Germain Morin, who edited them in 1918. Augustine's festival is Aug. 28. A new translation of the *City of God* was published in Everyman's Library, 1946.

Alexander Souter

Bibliography. S. Augustine and His Age, J. McCabe, 1902; S. Augustine, A. Hatzfeld, Eng. trans. E. Holt, 2nd. ed., 1903; S. Augustine, H. H. Lessaer, Eng. trans. T. Pope Arkell, 1931.

Augustine OR AUSTIN, SAINT (d. 604). The first archbishop of Canterbury. He was prior of the Benedictine monastery of S. Andrew at Rome when chosen by Pope Gregory I to lead a band of missionaries for the conversion of England. He set out in 596 and reached the Isle of Thanet in the spring of 597. Accompanied by forty monks, he had a courteous reception from Ethelbert, king of Kent, whose wife Bertha was a Christian. The king gave protection to the missionaries, permitted them to preach, and himself received baptism.

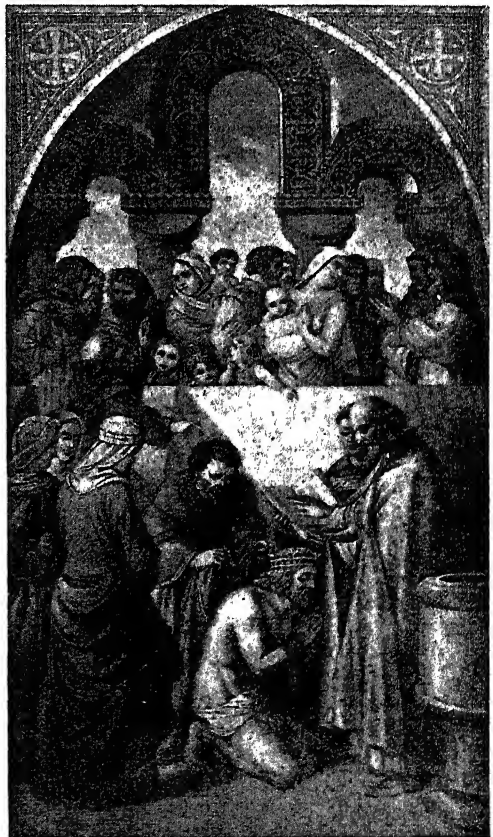
Augustine then went to Arles to receive consecration

from Virgilius as bishop. In 601 he received from Gregory the pallium giving him jurisdiction as archbishop over England. He was at liberty to adopt from the usage of other churches whatever should prove pleasing to God. He was instructed also to divide the country into dioceses, though the new religion actually extended but little beyond the borders of the kingdom of Kent. In the interests of Christianity an effort was made to come to an agreement with the Welsh bishops, and a conference was held at Malmesbury: but they refused to yield about observing Easter on the date fixed by Rome and other matters. On the failure of the conference they withdrew to Wales, leaving England to Canterbury. Augustine died May 26, 604, and was buried at Canterbury. His bones were later translated to the N porch of the abbey, a site now occupied by a hospital. His festival is May 26. Consult *Mission of S. Augustine to England*, ed. A. J. Mason, 1897.

J Clayton



Augustine, Saint and Bishop of Hippo



Augustine. The first archbishop of Canterbury baptizing Ethelbert, King of Kent

Painting by W. Dyce, R.A., in the House of Lords



AUGUSTINIAN. Monks of this order from the St. Bernard hospice
Courtesy of Swiss Federal Railways

Augustinian. Full name of the Austin canons, a religious order of R.C. clergy. The Augustinians follow the rule of Augustine, and while living in community are occupied with ordinary clerical work. Traditionally of apostolic origin, claiming S. Augustine as reformer and not as founder, they included S. Patrick and S. Columba and were reorganized in the 12th century, and in the 15th century were entitled canons regular. Early in the 13th century there were various small communities of hermits in central Italy all observing different rules. About 1250 a number of them were united to form a single religious order, living according to the Rule of S. Augustine. Special constitutions were drawn up for its government, which closely resembled that of the Dominicans and other mendicants. There followed a tendency to relax the rules; and the subsequent reaction led to a number of reforms being made within the order and produced upwards of a hundred different congregations.

The Reformation and later revolutions destroyed most of the Augustinian houses in England. Of some 90 existing then, 60 were included in the greater monasteries suppressed in 1538-40. The houses are still relatively numerous in the S. of Eire, while on the continent the hospices on the Great St. Bernard and the Simplon are served by monks of this order.

The canonesses regular of S. Augustine, communities of women living by rule, are of similar origin.

The name is also given to the Austin Friars, a religious order of mendicants dating from the 5th century. Their habit was black, and the site of their house in the City of London is commemorated by the street, Austin Friars (*q.v.*). This street was seriously damaged by bombing during 1940-41 and the Dutch Reformed church, sole remaining link with the friars, was totally destroyed.

Augustów. Town of Poland, in the district of Białystok, formerly in Russia. The town is in the lakes region W. of the Niemen, and has canal connexions with this river and by the canalised Biebrza (Bobra) with the Vistula. It is 18 m. S. of Suwalki, and has cattle and horse markets and a timber trade. It was founded in 1557 by Sigismund II. A battle of the First Great War was fought here between the Germans and the Russians, Sept. 14-Oct. 3, 1914. The former failed to maintain a vigorous advance and lost about 60,000 men, after which the Russian line ran through the town for a few months.

Augustulus, ROMULUS. Last Roman emperor of the West. He was the son of the powerful Pannonian Orestes, who with the help of the *foederati* (barbarian irregulars in the Roman army) deposed the emperor Julius Nepos and set his own son on the throne (475). The young emperor proved utterly incompetent, and the Romans expressed their contempt by changing his name from Augustus to the diminutive Augustulus. Refusing the demand of the *foederati* for a third part of Italy, Orestes was besieged in Pavia by Odoacer, his shield-bearer and former ally, and slain (476). Augustulus abdicated, and was permitted to retire to Campania with an annual pension of 6,000 pieces of gold.

Augustus. Masculine Christian name, meaning venerable or revered. As a mark of respect it was given to Octavius, the great-nephew of Julius Caesar, known later as the emperor Augustus. The name has been popular since the Revival of Learning. Augustine, or little Augustus, is a variant. The French form is Auguste and the feminine is Augusta.

AUGUSTUS: FIRST EMPEROR OF ROME

A. D. Innes, Author of *A General Sketch of Political History*

This account of Julius Caesar's great-nephew and successor describes the part taken by Augustus in founding the Roman Empire. See also Rome, and the biographies of Julius Caesar and other great Romans

Gaius Octavius, most commonly known as Augustus, the first of the long series of Roman emperors, was born Sept. 23, 63 B.C. He was the son of another Gaius Octavius by a niece of Julius Caesar, who by his will made the boy his adopted son and heir. Hence, according to the Roman custom, the name Gaius Octavius was changed to Gaius Julius Caesar Octavianus, and during the years between the murder of Julius (March 15, 44) and his own assumption of the imperial dignity in 27, he is generally named Octavian.

The murder of Julius Caesar threw the Roman world into chaos. It was the work of men who wished to restore the republican constitution which the dictator had overthrown. On the other hand, Mark Antony, a lieutenant and a favourite of the murdered dictator, was bent on avenging his death and on securing the supremacy for himself. The young Octavian, who had been absent from Italy, returned at once to Rome, accompanied by his friend and counsellor Agrippa, to claim his inheritance

—and to seek for something more. Self-contained, determined, and inscrutable, he completely concealed his intentions from the triumphant conspirators, who imagined that he would be a tool in their hands. Caesar's partisans were already in arms under the leadership of Antony, who at first imagined that Octavian could be disregarded; but the veterans soon gave their allegiance to Caesar's adopted son. Octavian dropped the mask. An alliance was made between him and Antony: the two had a common cause, at least until the republicans should be overthrown. For the time policy demanded that they should act in concert.

Under the Roman system nearly all the Roman armies were in the provinces, under the control of the proconsuls, the provincial governors, not in Italy proper. Antony, the governor of two provinces, marched into Italy at the head of an army. The Roman world was in a state of open civil war, and the official government at Rome was compelled to appoint Antony

and Octavian, with Marcus Lepidus, as triumvirs—a commission of three with almost unlimited powers for the restoration of order (Nov 27, 43). The triumvirs proscribed a large number of their personal enemies, of whom as many as were seized were put to death.

In 42 Antony and Octavian carried their armies from Italy to the Balkan Peninsula to fight the two chiefs of the republican party, Brutus and Cassius, who had taken up the governorships of the E. provinces of the republic. The victory of Philippi (42) made the Caesarians all-powerful. Octavian and Antony in effect divided the Roman world between them, Octavian taking the west and Antony the east, while Lepidus was relegated to obscurity. During the next ten years the two were more than once on the verge of open war, but a formal reconciliation was effected by a marriage between Antony and Octavia, his colleague's sister. Meanwhile, Octavian was organizing his supremacy in the W. In 31 the arrogance of Cleopatra, the Egyptian queen whose fascinations had made Antony her slave, provided the excuse for an attack upon her which was in effect an attack upon Antony. Octavian's great minister Agrippa won a decisive victory over Antony's fleet at Actium (Sept. 2, 31); and when Octavian advanced against Egypt in the following year Antony and Cleopatra committed suicide, and Octavian at the age of 33 stood without a rival in the Roman world.

The Roman republic, based upon what had been the organization of merely a city state, had gradually acquired first an ascendancy and then an effective dominion over Italy; had conquered Carthage and annexed her empire; had extended her dominion over the Hellenic world, over Asia up to the Euphrates, over Egypt, and finally over Gaul. Thus its boundaries were in effect the Rhine, the Danube, the Euphrates, the deserts of Africa, and the ocean; but it had not adapted its city-state organization to its imperial expansion. Its provinces were governed by proconsuls, appointed for a term of years, virtually irresponsible to any authority and having entire control of the armies in their respective provinces. Such a system could not last. The primary necessity was the establishment of a supreme central authority to which the provincial governors should be responsible. This had been fully realized by Julius Caesar, who had made himself the supreme central authority. But Caesar had openly

grasped his authority as a master of armies—a claim wholly incompatible with the republican idea; and since he could obviously crush any open resistance, he had fallen beneath the daggers of assassins. It was the work of Octavian to accomplish Julius Caesar's work by avoiding his error; to centralise

pate); though the Roman world spoke of him as Caesar, the name which was appropriated to all his successors, from whatsoever family they might have sprung. But the effective control was conveyed through the bestowal upon him by the Senate of the specific powers constitutionally belonging to par-



Augustus, first of the long series of Roman emperors. He was the great-nephew and adopted son of Julius Caesar, whom he succeeded

Vatican, Rome

authority in himself, but to do so through strictly constitutional forms by nominally maintaining a republic.

After the fall of Antony, Octavian returned to Rome, but continued officially to act as an extraordinary minister of the state, holding his appointment from the legal authorities, merely that he might deal with an emergency; and in 27 he resigned his position. But a real retirement was obviously impossible. The Senate proceeded to confer upon him titles of honour which in themselves did not imply power: *Augustus*, the name by which he is known to posterity; *pater patriæ*, father of his country; *princeps*, first citizen (whence it is now customary to refer to the new constitutional system as the Princi-

ticular officials, notably the tribunician power (*tribunicia potestas*) and the *imperium*, the absolute military authority over the armies, which belonged to the proconsuls. Hence came the title of *Imperator*, Emperor the actual use of which Augustus himself deliberately avoided. Both these powers were conferred upon Augustus for a term of years, but with the practical certainty that they would be extended to him for life. Thus Augustus was in effect made a tribune for life, with the power of initiating and of vetoing legislation, and also proconsul for life in all the provinces. The actual governors were no more than his subordinates or lieutenants, responsible to him. The officers of state continued to be appointed by election in accordance with republican forms, and to

pass automatically into the Senate, the official governing body. but since Augustus was authorised to nominate candidates and his nominees were invariably elected. the practical result was that officers and Senate were his own creatures. The permanence of the system was ensured by the practice of conferring the tribunician power and the *imperium*, during the lifetime of the *princeps*, upon the successor chosen by him.

Augustus reigned from 27 B.C. to A.D. 14, when he died, Aug. 19. He did not aim at any extension of the empire, though there were frequent and sometimes serious wars with the German and other barbarian tribes upon its confines, in the course of which there occurred one grave disaster, the annihilation by the German leader Arminius of a great Roman army under Quintilius Varus (A.D. 9). Within the empire itself, Augustus established the *Pax Romana*, the Roman Peace, of which a world long devastated by ceaseless wars was profoundly in need. The provinces were for the most part admirably governed under well-chosen administrators. Italy flourished greatly; of the city of Rome itself it was said that Augustus "found it of brick and left it of marble." Under him the intellectual and literary life of Rome attained its zenith; historians and poets found their theme in the glorification of Rome and Augustus. Virgil, in his great epic, the *Aeneid*, went back to ancient legend, but used it partly to emphasise the mythical glories of the house of Julius and still more to celebrate the grandeur of the qualities that had raised Rome to be the mistress of the world. The name of Horace is a household word. Catullus and Propertius, Tibullus and Ovid are among the famous poets of the Augustan Age; Livy's great history told the immortal story of Rome's heroes. The name of Maecenas, the minister and friend of Augustus, has become typical for patrons of art and literature. Finally it was in the reign of Augustus that "there went out a decree from Caesar Augustus that all the world should be taxed," and a Child was born in Bethlehem of Judaea—an event of more importance to the world than the establishment of the Roman empire.

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Augustus (1526-86). An Elector of Saxony. Younger son of Duke Henry of Saxony and brother of the elector Maurice, whom he succeeded in 1553, he beautified Dresden and encouraged agriculture and trade. Brought up a Calvinist, on his marriage with Anna of Denmark, in 1548, he became a Lutheran, and after his succession to the throne placed the Calvinists under penal laws. He died at Dresden, Jan. 21, 1586.

Augustus (1670-1733). King of Poland and elector of Saxony, known as the Strong. Born at Dresden, May 12,



Augustus II,
King of Poland

1670, he was the second son of John George III, elector of Saxony. In 1694 he succeeded his brother John George IV as elector, and in 1697 was elected king of Poland. In 1702 he was defeated at Clisow by Charles XII of Sweden, who forced him to give up the Polish crown, which he regained in 1709 after defeating Charles at Pultowa. Marshal Saxe was the most famous of his many illegitimate children. He is described both as Augustus II, king of Poland, and as Frederick Augustus I, elector of Saxony. He died at Warsaw, Feb. 1, 1733. In his later years he became a Roman Catholic.

Augustus (1696-1763). King of Poland and elector of Saxony. Son of the elector Augustus the Strong, whom he succeeded in Saxony in Feb., 1733, he was elected king of Poland in Oct. of the same year. During the Seven Years' War, in which he sided with Austria, Saxony was occupied by the Prussians and Augustus lived in Poland, returning to the electorate a few months before his death, Oct. 5, 1763. From 1746 Count Heinrich von Brühl, whom he made prime minister, was the real ruler of Saxony.



Augustus III,
King of Poland

Auja. River of Palestine. It flows into the Mediterranean about 4 m N. of Jaffa. On Dec. 20-21 1917, Scottish troops crossing the river surprised the Turks and drove them from Jaffa, enabling Allenby to advance.

Aujila. An oasis of Libya. On Nov. 24, 1941, it was captured by a

mobile column or the 2nd Punjab and 6th South African armoured car regiments. The British forces withdrew when Rommel counter-attacked in Jan., 1942.

Auk. Name of two birds of the family Alcidae, which includes also the guillemots and puffins. *Alca impennis*, the great auk or gare-fowl, as it was commonly called, was the only bird of the northern hemisphere incapable of flight, its wings being little more developed than those of the penguin, which it somewhat resembled in general appearance. It was about as large as a goose, and had black plumage on the head and back, with white beneath. As its legs were placed very far back, it had the appearance of sitting on its tail when on land.



Auk. Extinct Great
Auk and egg

It formerly ranged from the Bay of Biscay to Greenland, but was found in greatest numbers on certain rocky islands near Iceland and off Newfoundland. The bird was quite helpless against enemies when on land, and was killed in vast numbers for the sake of its feathers. The last known example in Europe was killed in 1844. Eggs of the great auk are highly valued by collectors, as much as 315 gs. having been given

for a fine specimen. Only about 70 examples are known. (Consult 'The Great Auk, S. Grieve, 1885.)

The little auk (*Mergulus alle*) is a small bird of the same family. It is only about



Auk. The Little Auk

8 ins. in length and is provided with flying wings. It resembles a small guillemot, and is a winter visitant to the northern shores of Scotland. The word auklet is used for still smaller birds of this kind.

Auldearn, BATTLE OF. Fought May 9, 1645, between Royalists under Montrose and Covenanters under John Hurry. The village

from which it takes its name is about 3 m. E. of Nairn. Montrose, after his brilliant retreat from Dundee, found that his pursuers had divided their forces. Thereupon he turned against Hurry's detachment, then near Inverness. But Hurry lured on Montrose, who, on May 8, reached Auldearn.

During the night the Covenanters sought to surprise their foes but they failed, and early on the 9th the battle began. The cavalry of the Covenanters were routed; of the infantry some fled, but in the centre they stood firm and were killed almost to a man. The forces engaged were only a few hundred.

Auld Lang Syne. Song by Robert Burns, written 1789 and based on popular verses then current in many versions. The tune, to which it was set many years later, is claimed to be by an Englishman, Wm. Shield (1748-1829), though it is possible that he only adapted a Scottish air. The ceremony of singing Auld Lang Syne as a parting song with hands linked in a circle has spread from Scotland throughout the British Empire, though usually only Scots observe the correct ceremonial, which is to delay the linking of hands until the final verse.

Auld Lights (Old Lights). Minor branch of Scottish Presbyterianism. On Dec. 6, 1733, there was formed the Associate Presbytery, a handful of dissenters from the Established Church of Scotland. But in 1747 a controversy over the oath administered to burghers arose. Some saw in these words, "the true religion presently professed within this realm and authorised by the law thereof," a submission to the Established Church from which they had seceded; others did not. So they split into two sects known as Anti-burghers and Burghers. Again, in 1799, each of these bodies divided into two on a dispute about making the Solemn League and Covenant a term of communion, the objectors being dubbed Auld Licht Burghers and Auld Licht Anti-burghers. Although Burghers and Anti-burghers united, Sept. 8, 1820, the Auld Lights of both bodies held aloof from each other and from all other sects until they coalesced in 1842 as the United Original Seceders, later adopting the style of the Original Secession Church. The Auld Lights have received world-wide fame in the stories of Sir James Barrie. See Presbyterianism.

Auld Reekie. Nickname for Edinburgh, from the smoke or

"reek" of the crowded buildings of the old town.

Aulic Council (Gr. *aulē*, court). Court of justice of the Holy Roman Empire, known in Germany as the Reichshofrat. Established as a kind of privy council by the emperor Maximilian I in 1497, the duties of its members were to assist him in governing his dominions, Germany and Austria. In 1648, by the treaty of Westphalia, its constitution and powers were defined. From this time onwards its work was almost solely judicial, and its members heard cases of importance till 1806. See Empire, Holy Roman.

Aulie-ata. Fortified town of Russian Turkistan, in Kazakh S.S.R. It stands on the river Talas, 150 m. N.E. of Tashkent, and has celebrated fruit gardens and cattle and horse markets. It is peopled chiefly by Kirghiz.

Aulis. A seaport of ancient Greece, in Boeotia. It stood on the Euripus, the channel separating Euboea from the mainland. It was here that the Greek fleet assembled before it set out for Troy, and Agamemnon prepared to sacrifice his daughter Iphigeneia.

Aullagas or **Lago Poopó.** Salt lake of Bolivia. Situated in the dept. of Oruro, W. of the Cordilleras, it is 70 m. long by 28 m. broad, and receives with the Desaguadero the outflow of Lake Titicaca.

Aulos (Gr., flute, pipe; in Lat., *tibia*). Greek and Roman musical instrument, a pipe or flute. The Latin word *tibia* means shin-bone, and these instruments, made of bone or other materials, were named from this fact or possibly from their shape. They were of various kinds. The *monaulos*, a reed instrument with one hole, was like a flageolet; the *plagiaulos* (cross-flute) was a bassoon or an ordinary flute. Some *tibiae* were straight, others bent. Again, they were called *dextrae* or

sinistrae, according as they were held in the right or left hand, when pairs of flutes were used blown through one mouthpiece.

Aulularia. Latin comedy by Plautus. The central figure is a miser named Euclio, who has discovered a little pot (*aulularia*) of gold originally buried in the garden by his grandfather, and always fears it may be stolen. The Aulularia supplied Molière with the character of Harpagon in *L'Avarice*.

Aumale. Town of N. France, in the dept. of Seine-Inférieure. It stands on the river Bresle, 47 m. by rly. N.E. of Rouen, has a 16th century church, and manufactures glass, cloth, leather, and steel. Known variously as Aubemale, Aumerle, and Albemarle, Aumale has since 1850 given the title of duke to a son of the duke of Orléans. It came under German occupation, June, 1940-Aug., 1944. The English titles of earl and duke of Albemarle were derived from it.

Aumale. Town of Algeria. It is 57 m. S.E. of Algiers, on the site of the ancient Roman town of Auzia. Named after the duc d'Aumale (1822-97), governor of Algeria, it is a military post.

Aumale, CHARLES, DUC D' (c. 1554-1631). French politician. He was a zealous supporter of the Guises in the wars of religion against the Huguenots, and after the murder of the duke of Guise in 1588 was joint leader of the League with the duc de Mayenne. After his defeats at Arques and Ivry, he allied himself with Spain and surrendered several towns to the Spaniards. For this he was sentenced to be broken on the wheel, 1595. He escaped from France, and died in exile at Brussels, the last duc d'Aumale of the old line.

Aumale, HENRI, DUC D' (1822-97). French soldier and politician. Fourth son of Louis Philippe, born

in Paris, Jan. 16, 1822, he joined the army in 1839 and served with distinction in Algeria, of which he was made governor in 1847. In 1873 he was president at Marshal Bazaine's court-martial, and in 1879 became inspector-general of the army. He was expelled from France in 1886, but this decree of exile was revoked 1889. He died at Zucco, in



Auld Lights. The Original Secession church of Kirriemuir, made famous by the stories of Sir James Barrie. This structure made way for another in 1893

Sicily, May 7, 1897. His writings include an unfinished History of the Princes of Condé, and the Letter on the History of France protesting against a Bonapartist attack on the Orléans family. He was a member of the French Academy, and bequeathed his estate and collections at Chantilly to the Institute of France. See Chantilly.



Henri, duc d'Aumale
Winterhalter

Aumonier, STACY (1887–1928). English author. He was the son of a sculptor and was educated at Cranleigh. He became a landscape painter and interior decorator, exhibiting at the principal London galleries. In 1908 he began a new career, as entertainer, giving recitals of his own sketches. In 1913 he turned to writing, and, after serving in the First Great War, quickly established himself as an author, with a reputation resting chiefly on his masterly short stories. His volumes include *The Love-a-Duck*, *Odd Fish*, *Miss Bracegirdle and Others*, and *The Baby Grand*. He also wrote two novels, *Olga Bardel* and *The Querrils*. Aumonier died in London, Dec. 21, 1928. His wife was the pianist, Gertrude Peppercorn.



Stacy Aumonier,
English author

Dec. 21, 1928. His wife was the pianist, Gertrude Peppercorn.

Aune (Lat. *ulna*, elbow). Medieval European measure of length, about 47 ins., corresponding to the English ell (*q.v.*). In France, up to 1812, it equalled 1·885 metres, in Belgium one metre, and in Jersey 4 ft. Its use still lingers in Switzerland.

Aura. Term used for any subtle emanation. In medicine, it is applied to symptoms which may precede an epileptic attack or attack of hysterical fits, such as flashes of light, odours, sounds or voices, peculiar sensations in the pit of the stomach, twitching of the muscles, and psychic changes such as irritability or depression.

In theosophy the aura is defined as a subtle invisible essence that emanates from and surrounds all creatures and things, to well-marked but variable limits, the limits depending upon the state of conscious development. The human being is said to have five distinguishable

interpenetrating emanations, including the finest spiritual, the intuitional, mental, emotional, and physical aspects of his nature. See *Aureole*; *Halo*.

Aurangabad. A district and city in the N.W. of the Indian state of Hyderabad. The district is a highly cultivated area, chiefly for cotton and native food grains. The city stands on the Dūdha, an affluent of the Gōdāvari, 235 m. by rly. E.N.E. of Bombay. Built by Aurungzebe, it has ruins of the emperor's palace, and a fine mausoleum erected by him to receive the remains of his favourite daughter. It has cotton mills and trades in cereals. Most of the people in the district are Hindus; in the city there are almost equal numbers of Hindus and Mahomedans. Pop. of city, 36,876.

Aurantiaceae. Family of trees and shrubs, mostly natives of Eastern Asia. Its members have fragrant, edible, pulpy fruits, e.g. orange, lemon, citron, and lime. The leathery leaves have transparent dots—cells filled with volatile oil; the leaf-blade is jointed to the stalk. The flowers have four or five sepals and petals. They are now usually referred to as Rutaceae.

Auray. Town and harbour of France, in the dept. of Morbihan. It is a road and rly. junction near the mouth of the Auray river, 12 m. by rly. W. of Vannes. It has two churches, one, that of S. Esprit, being no longer used for religious worship, and a Carthusian monastery, now an establishment for the deaf and dumb. There are valuable oyster-beds, and fishing is carried on. The church of S. Anne d'Auray, in the neighbourhood, is a famous place of pilgrimage. Auray was the scene of an English victory over Charles of Blois in 1364.

Aurelia. Name of a Roman plebeian gens or clan. The chief family name is Cotta. Gaius A. Cotta (c. 124–74 B.C.), governor of Gaul, was a well-known orator and one of the interlocutors in two dialogues by Cicero. His brother Lucius, a friend of Cicero, is known for a law (70 B.C.) named after him, which effected an important alteration in the composition of the jury courts.

Aurelian. Roman emperor A.D. 270–275. Born about A.D. 213, the son of a Pannonian peasant, his full name was Lucius Domitius Aurelianus. He became one of the chief officers of his predecessor Claudius, upon whose death he was proclaimed emperor by the soldiers. At this time barbarians were pressing hard upon the north-

ern defences; a separate empire had arisen in revolted Gaul; while in the east Zenobia, queen of Palmyra, designed to set up a kingdom of her own.

Aurelian first attacked the barbarians and obtained a decisive victory (271) over the combined forces of the Juthungi and Alamanni in Umbria. He then returned to Rome, quelled a serious sedition, and began the building of the wall named after him. He next turned his attention to Zenobia and the East (272), and a brilliant campaign ended in the capture of Zenobia and the destruction of Palmyra. The defeat of Tetricus, the rival emperor of Gaul, in a battle near Châlons (273), brought the whole empire again under Aurelian's rule. The title of *Restitutor Orbis* (Restorer of the World) was conferred upon him,



Aurelian, Roman
emperor
British Museum

and his triumph in 274 was the most splendid ever celebrated in Rome. As a ruler he was an uncompromising believer in absolutism, but the financial and other reforms introduced by him in the rare intervals of peace show that he possessed a statesmanlike grasp of political affairs and great administrative gifts.

Aurelian's Wall. Defensive wall in ancient Rome. Begun by Aurelian A.D. 271, it was completed by Probus in 280, and frequently repaired by later emperors. Erected after the invasion of Italy by the Alamanni and Juthungi, it was more than 12 m. in circumference, about 60 ft. high, and had some



Aurelian's Wall. Remaining portion of the great wall built for the defence of ancient Rome

hundreds of towers. Much of the original circuit is still standing.

Aurelianus, CAELIUS (5th century A.D.). Greek physician of Sicca in Numidia. He was the author of two extant medical works, one on acute, the other on chronic diseases. They are valuable as a source of information on the "methodic" school.

Aurelian Way. Ancient highway in Italy. Beginning at the foot of the Palatine Hill at Rome, it left the city at the Aurelian Gate, and after traversing Latium, Etruria, and Liguria along the coast, ended at Arelat̄s (Arles) in Gallia Narbonensis (Narbonne).

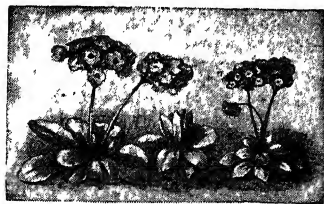
Aureole (Lat. *aurculus*, golden). Name given in Christian art to the radiance encircling the entire figure of divine and holy personages. It is distinguished from the nimbus, which surrounds the head only, though the two terms are often interchanged. Originally it referred only to the persons of the Holy Trinity and the Blessed Virgin Mary. See Nimbus; Saint.

Aures. Mountain range in the S.E. of Algeria. The ancient *Mons Aurasius*, it forms part of the Saharan Atlas and extends east from Biskra for about 80 m. Jebel Shellia, 7,611 ft., is the highest peak and the culminating point of Algeria. The intervening valleys are fertile and peopled by a Berber tribe, the Shawia.

Aureus. Gold coin in ancient Rome. Introduced during the second Punic War (218-201 B.C.), its average weight was 120 grs. and its value about £1. After the time of Constantine it was replaced by the solidus. See Numismatics.

Auricle (Lat. *auricula*, little ear). Medical term for upper right and left chambers of the heart (q.v.).

Auricula (*Primula auricula*). Perennial Alpine herb. A native of the Swiss Alps, it has a thick root-



Auricula. Swiss Alpine perennial from which the familiar garden flowers are derived

stock and a rosette of smooth, fleshy leaves, dusted on both surfaces with white powdered wax. The yellow flowers are borne, like those of its relative the cowslip, in a small cluster at the top of a leafless stem. The auriculas of the garden are cultivated varieties produced from an original hybrid

between *P. auricula* and *P. hirsuta*, the hairy primrose.

Auriga. Driver of a chariot in the races in the Roman circus. The charioteers were divided into four parties or "factions"—the Blues, Whites, Greens, Reds—who in imperial times exercised an important political influence.

The name is also applied to one of the northern constellations. Figured as a kneeling charioteer—no chariot is visible—it is described in Ptolemy's star list as a shepherd carrying a goat on his shoulder and leading a pair of kids by the hand. Its Greek name was Heniochus, bearer of the reins.

The main stars are easily found, for the chief, the great Capella, with its yellowish light, almost balances bright Vega on the opposite side of the Pole Star, and at midnight in winter is the brightest star in the zenith. The four chief stars form a cross, Beta Aurigae, "the holder of the reins" being the head of the cross and Capella at the point of the western arm.

Aurignacian. The early period of the Upper Palaeolithic Age in Europe. The last glacial epoch was retreating when the Cro-magnon race entered Europe and subdued the Mousterian. The flint implements—gravers, awls, and spoke-shaves—are associated with bone shaft-straighteners and personal ornaments. The graphic prehistoric arts were developed. Named from a grotto at Aurignac in Haute Garonne, the stations, extend from S. Wales (Bacon Hole and Paviland) to the Danube. See Anthropology.

Aurillac. Town of France, the capital of the dept. of Cantal. It stands on the river Jordanne, 135 m. by rly. N. by E. of Toulouse, on the slope of a hill crowned with an old castle. It is on the road and rly. across the southern end of the Auvergne Mts. Aurillac was noted in the Middle Ages for its abbey, the church of which, rebuilt in the 17th century, still remains. Another fine building, once a college, houses a museum and a library. Pop. 22,174.

Auriol, VINCENT (b. 1884). For biography of this French president, elected 1947. see N.V.

Aurochs (Gr. *ouros*, buffalo; Ger. *ochs*, ox). Wild ox of Europe. Progenitor of the various breeds of domesticated cattle, it is mistakenly identified with the European bison, which still lingers in Lithuania and Caucasus. It was a huge animal, as is proved by the bones found in many parts of Britain. One example measured about 50 ins. from the tip of one horn to the other. By the 15th century it was found only in

certain forests of Lithuania, where the last survivors died early in the 17th century. It is represented in Great Britain by the half-wild cattle of Chillingham and Cadzow, which appear to have retained its general features, but are greatly reduced in size.

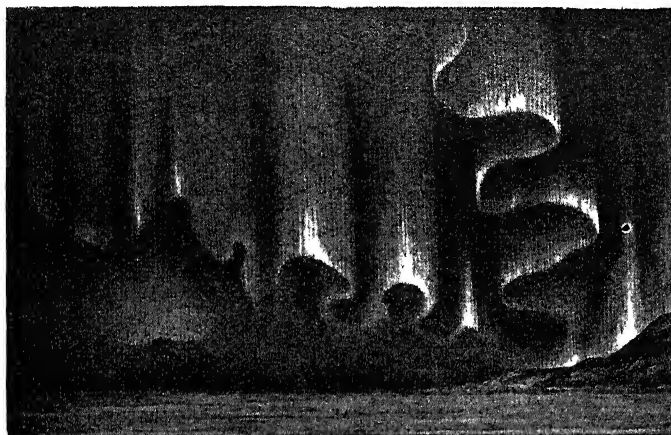
Aurora. Latin name for Eos, the Greek goddess of the dawn. She dwelt in the East and every morning rose from the ocean or from the couch of her husband Tithonus and traversed the sky in a chariot drawn by two horses. She was also the goddess of youth and beauty.

Aurora. City of Illinois, U.S.A., in Kane co. It stands on Fox river, 39 m. W.S.W. of Chicago, on the Chicago and North-Western and other rlys. It has a college, a Carnegie library, smelting-works, cotton mills, and carriage and wagon works, and is said to have been the first town in the U.S.A. to use electricity for street lighting. Pop. 47,170.

Aurora Borealis or **NORTHERN LIGHTS**. Luminous phenomenon seen in the sky chiefly at night and in northern latitudes. It exists in almost identical forms in the Antarctic (*Aurora Australis*), and some beautiful effects were recorded by E. A. Wilson, who accompanied Captain Scott on the voyage of the Discovery. The most striking were the auroral curtains, so called from their resemblance to great folds of drapery.

In general, the Northern Lights appear as either a whitish arc of light or quivering, rapidly moving beams. Sometimes a faint illumination without definite form is seen, and again it takes the form of clouds or patches of light. The quivering beams, in N. latitudes, generally come out of the N., and usually follow the direction of the magnetic N. and S. line. Sometimes the colour has a reddish, yellowish, or greenish tinge. It is sometimes carmine, rarely violet. An auroral display generally begins early in the evening and lasts a few hours, though it may last for days and occur at any time. Aurora is most frequently seen in a belt of country which stretches from the N. of Norway S. of Iceland and Greenland. In the British Isles it is most common in the late evenings about the equinoxes, but in Norway and Greenland in mid-winter. The mean height is about 70 m., and although heights beyond 125 m. are unusual, one of 166 m. has been measured.

The association of these Northern Lights with Polar regions has led to the theory that they are electro-magnetic phenomena which are most strongly manifested at



Aurora. Wonderful effect of the aurora curtain (*Aurora Australis*), manifestation of the luminous phenomenon observed in the sky during Capt. Scott's first Antarctic expedition. It is almost identical with the *Aurora Borealis*
By permission of the Royal Society

either end of the great magnet the earth. The spectrum consists of a number of lines and bands due to oxygen and nitrogen. Changes in the relative strengths of the red and green oxygen lines in particular cause the different colours seen at different times.

The fact that aurorae occur near the poles may be explained by supposing that the luminosity is caused by charged particles reaching the earth from outer space, most probably from the sun. These particles are deflected towards the poles by the earth's magnetic field, according to the known laws of electromagnetism. There, as they enter the atmosphere, they collide with the atoms and molecules of the upper air and cause them to emit light, in much the same way as the electrons passing through a neon sign cause the gas inside to become luminous. Magnificent displays were seen over S. England on Jan. 27, 1938, and Sept. 18, 1941. See *Light*; *Spectroscopy*; *Sun*.

Bibliography. The *Aurora Borealis*, A. Angot, ed. F. Legge, 1896; *Photographic Atlas of Auroral Forms*, International Geodetic and Geophysical Union, 1930; *Meteorological Glossary*, Air Ministry, 1939; *Geomagnetism*, S. Chapman and J. Bartels, 1940.

Aurungzebe (1618-1707). Mogul emperor of India. His original name Mahomed was changed by his father to Aurungzebe, or throne-ornament. A rigid Mussulman, he was made governor of the Deccan in 1655, and in 1658 he seized the throne. Crowned emperor in 1659, he assumed the title of al-amgir (world-conqueror).

His reign is often regarded as a kind of golden age, but the distrust and suspicion that were

fostered under his despotic rule brought about the decay of the Mogul empire. By alienating the Rajputs he lost his best fighting men, and the strength of the empire was undermined by incessant



Aurungzebe,
Mogul emperor
British Museum

struggles against the Mahrattas. He died at Ahmadnagar, Feb. 21, 1707. Consult *Short History*, Sir J. Sarker, 1930.

Auscultation (Lat. *auscultatio*, listening). Method of listening to sounds in various parts of the body, either by direct application of the ear or by the stethoscope. It is most often employed for examination of the heart and lungs, but can also be used for listening to the heart-beat of the infant in the womb and to sounds made by aneurisms or pulsating tumours.

Ausgleich. A German word, meaning compromise or compact, specially applied to the agreement made in 1867 between Austria and Hungary. It settled the financial and other relations between the two parts of the Dual Monarchy, and in a slightly altered form it continued until 1919.

Ausonia. Town of Italy, in Campagna. In the Second Great War it was captured on May 14, 1944, by French troops when they breached the Gustav Line.

Ausonius, DECIMUS MAGNUS (c. 310-394). Roman poet. Born

at Burdigala (Bordeaux), he was tutor to the emperor Valentinian's son, Gratian, and consul in 379. His best-known work is *Mosella*, a description of a trip up the Moselle, written in a style reminiscent of Virgil and noted for its appreciation of the beauties of nature.

Auspicia (Lat. *avis*, bird; *spicere*, to see). Observations made by the augurs in ancient Rome from the flight and cries of birds. Auspices were also taken by observing the manner in which the *pulli*, or sacred chickens, ate their food. If they devoured it so greedily that pieces dropped out of their mouths, the omen was regarded as favourable; but if they were unwilling to leave their cage, it was unfavourable.

Aussee. Town of N.W. Styria, Austria. It stands on the Traun, 8 m. N.E. of Hallstatt, and 63 m. by rly. E.S.E. of Salzburg. It is a health and pleasure resort, visitors being attracted by its saline baths and magnificent scenery. The vicinity produces much salt and has several beautiful lakes.

Aussig. Town of the Bohemian portion of the republic of Czechoslovakia, formerly in Austria, and transferred to Germany as part of Sudetenland in 1938. It is situated amid mountains at the union of the Biala and Elbe, 68 m. by rly. N. of Prague. It has a town hall and an old church, is a centre of the chemical industry, and trades in coal and other products. It is a railway centre and carries on an active river trade.

Aussig was fortified in the Middle Ages. In 1426 a German army was routed by the Hussites outside its walls, and the town destroyed. On the restoration of Czechoslovakia in 1945, the large German pop. was expelled.

Aust-Agder. Fylke or county of S. Norway, formerly called Nedenes, bordering the Skagerak. Area, 3,607 sq. m. Pop. 73,816. Arendal is the chief town.

Austen, JANE (1775-1817). English author. The seventh child of the Rev. George Austen, she was born in his rectory at Steventon, Hampshire, Dec. 16, 1775. In early childhood she had some brief experience of school, when she and her sister Cassandra attended a seminary at Reading, but her education was chiefly obtained at home: her accomplishments including music, dancing, French, and a little Italian. Her knowledge of mankind was for the most part derived from keen observation.

The limitations of her work, freely recognized by herself, were fixed by her environment. She

never left England. She paid occasional visits to London, but Bath, Winchester, and Southampton were the only towns in which she ever resided, and her life was mainly spent, whether at



J. Austen

Chawton, Hants, or in country houses, with people whose "comfortable" incomes were derived from rural rent rolls, or tithes.

Her novels, which have tended to become increasingly popular, require a considerable sense of humour for their appreciation, but they contain no incidents properly to be described as sensational, and there is scarcely a page of passion in any of her simple plots. Suicide and murder have no place, and the one or two girls who have a "past" are almost as much in fault as their lovers. Indeed, for the reader sparsely endowed with imagination there is not a thrill in the whole of Jane Austen's work. Nor are there even descriptions to fill the gaps for the unthinking. Here and there a house or its surroundings may be sketched, but material conditions are usually presented just sufficiently to convey general impressions.

Jane Austen was almost wholly concerned with the minds of men and women, and her people are not to be confined by mere dates. "Old-fashioned" is a term which only a superficial intelligence would be inclined to apply to her books. Creations like Mr. Collins, the sycophantic parson, Miss Bates, the garrulous, inconsequential spinster, Mrs. Norris, the parsimonious widow, or Lady Catherine de Bourgh, the pompous patroness, are as much of our own time as of hers. Her special triumph, however, was in the realization of young women of her own class, and her masterpieces are Elizabeth Bennet, the heroine

of *Pride and Prejudice*, and Anne Eliot, the heroine of *Persuasion*, whose vivacity is reflective of the author's own nature.

Of Jane Austen's six "authorised" novels *Pride and Prejudice* was completed in 1797, and *Sense and Sensibility* in 1798, in which year much of *Northanger Abbey* also was written, as a satire, in great part, on Mrs. Radcliffe's "horror" stories. *Mansfield Park* was completed in 1813, *Emma* in 1815, and *Persuasion*, her most mature novel, in 1816. The first to be published was *Sense and Sensibility*, which came out in 1811. She left two uncompleted novels, *The Watsons* and *Sandford*.

An epistolary novel *Lady Susan*, written before she came of age, was published in 1871. *Love and Freindship*, a schoolgirl's attempt at satire, was published in 1922.

During her life her name was never printed on her title pages. Her life was uneventful, and so little was she influenced by the movement of the world that, though the French Revolution and the Napoleonic wars passed in her time, there is but the merest allusion to foreign affairs in her novels or her correspondence with her sister. This is all the more strange since two of her brothers were on active service in the navy. Nor does love appear to have played any serious part in her own experience; her philosophy of quiet irony seems to have been due as much to her temperament as to any marked habit of reflection.

In appearance, she was tall and slight, with small, regular features, hazel eyes, dark curling hair, and a fine complexion. The evidence goes to show that her life of forty-two years, which ended at Winchester, from rapid decline, on July 18, 1817, was one of intelligent happiness, usually spent in those easy circumstances which, on her own showing, were essential to her contentment. She is buried in the N. aisle of Winchester cathedral.

Bibliography. *Life and Letters*, W. A. and R. A. Austen Leigh, 1913; *Life*, F. Warre Cornish, 1913; *Jane Austen: a bibliography*, G. Keynes, 1929; *Jane Austen*, Lord D. Cecil, 1935; *Jane Austen*, E. Jenkins, 1938; and a novel, *Jane Fairfax*, N. Royde-Smith, 1937.

Austenite. Name given in metallurgy to a compound of iron and carbon formed when steel solidifies from the molten state. Named after the British metallurgist, Sir W. Austen, it is a non-magnetic solid solution of iron carbide, Fe_3C , in gamma-

iron. This, like all other solid solutions, has a homogeneous structure, but in ordinary carbon steels cannot be retained in a pure state by any known quenching methods. In alloy steels, however, austenite may be obtained by slow cooling. Austenitic steels are of great industrial importance, the most widely known being "Hadfield's Manganese Steel," containing 12 to 14 p.c. manganese. This, having enormous resistance to abrasion, is used for railway and tramway catchpoints. Another group includes the stainless steels containing 18 p.c. chromium and 8 p.c. nickel and their derivatives. All austenitic steels are non-magnetic. Austenitic cast irons contain high proportions of nickel, and sometimes chromium and copper also. When cooled slowly to ordinary temperatures they consist chiefly of austenite. The most important is "Niresist" (12-15 p.c. nickel, 5-7 p.c. copper, 1.5-4 p.c. chromium, 1-2 p.c. silicon, 2.75-3 p.c. carbon). This alloy is non-magnetic and possesses high resistance to corrosion by sea water, caustic liquors, acid mine waters, and other corrosive media. It has excellent resistance to scaling and growth up to a temp. of about 800°C. It is used chiefly for pump parts, marine castings, boiler fittings, etc. See Iron; Metallurgy; Steel.

Auster. Name given, particularly in Roman times, to a warm, dry, south or south-westerly wind. When very hot, dry, and dustladen it is called *sirocco*. See Wind.

Austerlitz, BATTLE OF. Fought between the French and the combined Austrians and Russians, Dec. 2, 1805. It was one of Napoleon's greatest victories. The small town from which it takes its name is in Moravia, about 14 m. from Brunn. The battlefield lies to the S.W. of this; the ground is mainly hilly, but to the S. it slopes to a region of lakes and marshes.

After a series of victories over the Austrians, that at Ulm being the most important, Napoleon marched to Vienna, which had just passed into his possession. Thence he led his army towards the enemy, who were assembling around Olmutz and had arranged for assistance from Prussia. The two forces came into contact on Nov. 28. On the night of Dec. 1 the French were drawn up behind the little river Goldbach, Davout's corps having just arrived from Vienna, and the allies were between that stream and Austerlitz.



Austerlitz. On Dec. 2, 1805, Napoleon overwhelmingly defeated the Austrians and Russians at Austerlitz, in Moravia, a victory followed by the peace of Pressburg. From an aquatint of the battlefield by Duplessis-Bertaux

The allied plan was to throw their full weight on the French right wing near Telnitz and cut off the retreat to Vienna which Napoleon was thought to have in contemplation, leaving only slender forces to guard the road that led to their base at Olmütz. This manoeuvre suited the French emperor admirably, for he immediately saw its weakness—the probability of a division of the enemy's forces. He accordingly prepared a counterstroke, meeting the enemy's main effort with only a thin line of men, while from his centre a stronger body assailed the flank of the allies at the critical moment.

Early on the morning of Dec. 2 the allies were on the move, four columns advancing to the main attack on the French right, where Davout was. The three leading columns were soon engaged near Telnitz, and heavy fighting ensued. The French, much inferior in numbers, were worsted, but they only yielded a little ground.

As the last and most northerly of these four allied columns advanced, Napoleon delivered his main attack, striking at the Russian flank. The latter turned unhesitatingly towards the foe, and on the plateau of Pratzen, really the centre of the field, there was a desperate struggle; other Russians arrived to support their comrades,

but at length they were beaten back. With this plateau in their possession, the French were able to move forward to the help of their right wing, capturing Sokolnitz, a village on the Goldbach, and with it a number of Russians.

In the third section of the battlefield the French left, under Murat and Lannes, was engaging the Russian reserves under Bagration. Here cavalry were used on a considerable scale, but eventually the French succeeded in driving their enemies back on to Austerlitz and in seizing the road that led to Olmütz. The allies meanwhile were striving to recover the plateau, but were beaten everywhere and soon received the order to retreat. The French guns swept the road to the S. which the allies were obliged to take; moreover, they broke the ice on the ponds, thus causing many to be drowned.

The numbers engaged were about 83,000 Russians and Austrians and 65,000 French. The former lost about 35,000, of whom half were prisoners, and the victors about 7,000. The result of the battle was the end of the coalition against France. Austria signed the treaty of Pressburg, while the Russians withdrew.

Austin. Capital of Texas, U.S.A., and the co. seat of Travis co. It stands on the Colorado

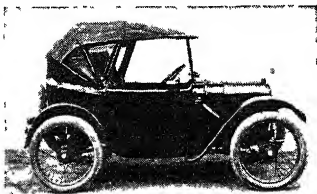
river, 145 m. W.N.W. of Houston on the Missouri, Kansas and Texas, and other rlys. It is the seat of the co-educational state university, 1883, and has a number of colleges and other educational institutions. The state capitol is a red granite structure which cost over £700,000. The city exports livestock, hides, cotton, wool, and grain, manufactures leather, cotton-seed oil, furniture, and agricultural implements, and has an important lumber industry. Pop. 87,930.

Austin, HERBERT AUSTIN, BARON (1866–1941). British motor manufacturer. Born at Missenden,



Lord Austin, British motor manufacturer

Bucks, Nov. 8, 1866, and educated at Rotham grammar school, he emigrated to Australia and studied sheep-shearing machinery. Returning to England in 1893, he was set in charge of production of the Wolseley Sheep Shearing Machine Company. He experimented with motor cars from 1895 and began to manufacture on his own account at Longbridge, nr. Birmingham, in 1905. By 1939 his works covered 220 acres,



Austin. Original "baby Austin" car, as introduced in 1922

employed 20,000 workers, and had made 750,000 cars, among which the 20 h.p. and 12 h.p. models were world-famous and the 7 h.p. or "baby" car was at first unique. Austin was Unionist M.P. for King's Norton, 1919-24, was knighted in 1917 for his services in making munitions, and raised to the peerage in 1936. From that year he helped to organize the "shadow" factory scheme. He gave £250,000 to Cambridge university for scientific research. As his only son was killed in action, 1915, the peerage became extinct on Austin's death, May 23, 1941.

Austin, ALFRED (1835-1913). English poet. Born at Headingley, Leeds, May 30, 1835, and educated at Stonyhurst and at Oscott, he graduated at London university in 1855 and was called to the bar. Editor of *The National Review*, 1883-93, he was for many years on the staff of *The Standard* newspaper. In 1870 he brought out a poor, uncritical attack on Tennyson, Browning, Matthew Arnold, and Swinburne, called *The Poetry of the Period*. Later he published many volumes of mediocre verse, lyrical and dramatic, none of which, save perhaps one or two sonnets, possesses any permanent value. He had, however, a genuine love of nature, and expressed this happily in prose works such as *The Garden that I Love*, 1894. He succeeded Tennyson in the laureateship, after a vacancy, in 1896 and died June 2, 1913. *Consult* Autobiography, 1911.



Alfred Austin, English poet
Elliott & Fry

Austin, FREDERIC (b. 1872). British singer and composer. Born in London, March 30, 1872, he came of a musical family and began his career as an organist. He studied singing under Charles Lunn, making his debut in London in 1902, and started his operatic career in 1908 as Gunther

in Wagner's *The Ring* at Covent Garden, London. He joined the Beecham opera company when it was established in 1915. He arranged the melodies for the 1920 revival of *The Beggar's Opera* (q.v.), and acted the part of Peachum in this production.

Austin, HERBERT WILFRED (b. 1906). British lawn tennis player. Born at Norwood, Aug. 20, 1906, he was a schoolboy champion while at Repton and captained the Universities team while at Cambridge in 1928. In 1932 he became the first Englishman for many years to reach the final at the Wimbledon tournament, but lost to H. E. Vines (U.S.A.). He helped England to regain the Davis Cup in 1933, and was a mainstay of the team for several years, possessing classic strokes but being sometimes handicapped by want of stamina. In 1938, ranking as England's No. 1 amateur, he again lost the final at Wimbledon, this time to J. D. Budge (q.v.).



H. W. Austin, British lawn tennis player

The following winter he became a keen propagandist for the Moral Re-armament movement, then acted with the Buchmanites in the U.S.A., opposing military service until called up by the U.S. army authorities in 1943. Austin, who was widely known as "Bunny," married the actress Phyllis Konstam, 1931. He wrote *Lawn Tennis: Bits and Pieces*, 1930.

Austin, JOHN (1790-1859). British jurist. He was born near Ipswich, May 3, 1790, and was the son of a prosperous miller. As a youth an officer in the army, he was called to the bar at Lincoln's Inn in 1819, married in 1820, and included Bentham and James and John Stuart Mill among his friends. Professor of jurisprudence at University College, London, 1826-32, he went to Malta in 1836 to study its institutions, but was obliged to return to England owing to ill-health. He died in Dec., 1859.

His lectures, published in 1832 as *The Province of Jurisprudence Determined* and as *Lectures in Jurisprudence*, are authoritative. His definitions of legal and juristic terms were famous, one of the best known being that of sovereignty. He sought to find the essential distinction between law and morals,

and according to his conception all law comes from the command of the sovereign. His theory is opposed by the historical school, which regards customary law as existing quite independent of sovereignty and anterior to it. His *Province of Jurisprudence* was re-issued in 1861 with a preface by his widow, and a later edition of his *Lectures*, edited by Robert Campbell, in 1869 (new ed. 1911). *See* Jurisprudence; State; *consult also* The Austinian Theory of Law, W. J. Brown, 1906.

Austin Friars. Thoroughfare in the City of London. On the W. side of Old Broad Street, near the Bank of England and Stock Exchange, its name is derived from an Augustinian monastery founded 1253. At the dissolution in 1536-8, the house and grounds passed to the first marquess of Winchester, and in 1550 the church was granted by Edward VI to Protestant refugees, mostly Dutch. Of this building, known as the Dutch Reformed church, the spire and transepts were demolished in 1600, and the nave was restored in the 19th century. The church was destroyed during the bombing of 1940-41. Within were interred the remains of its founder, Hubert de Burgh, and Edward Stafford, duke of Buckingham.

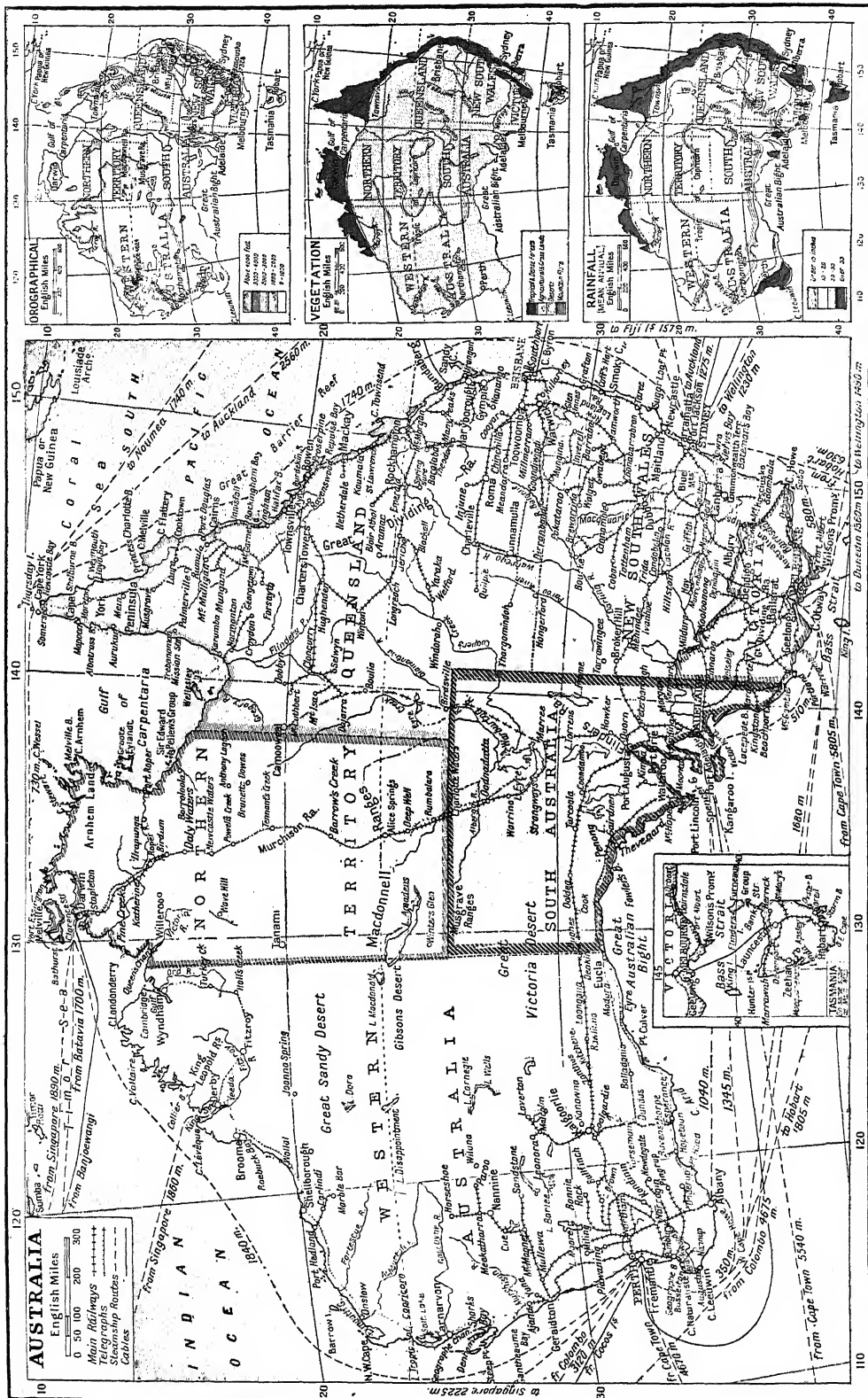
Austral, FLORENCE (b. 1894). Australian operatic singer. Born at Richmond, Melbourne, April 26,



Florence Austral, Australian singer

1894, she studied singing at the University Conservatorium, Melbourne, and later studied opera at the London School of Opera and in New York under Sibella. She made her debut in grand opera at Covent Garden as Brünnhilde in Wagner's *Valkyrie*, 1922, and was recognized as a great exponent of Wagnerian operas, appearing at many concerts throughout Great Britain. She first toured America in 1926, subsequently making six tours in U.S.A. and Canada, two in Australia, and several in Holland; and also appeared as Brünnhilde in *Siegfried* at the State Opera House in Berlin, 1930. She married the flautist John Amadio.

Australasia. Term comprising the Commonwealth of Australia, the Dominion of New Zealand, and their dependencies. *See* Australia; New Zealand; Fiji Islands, etc.



Larger scale maps of the different States that make up the Commonwealth of Australia will be found under their respective headings : New South Wales, Queensland, Victoria etc.
To face page 785

AUSTRALIA: ITS HISTORY AND RESOURCES

H. L. HARRIS, Author of *Australia in the Making*, etc.

This general description of the continent and Commonwealth of Australia deals with its discovery, its colonisation, and its subsequent political, economic, and industrial history, including the part its people have played in two Great Wars. See the articles on the various states of the Commonwealth, and on Canberra, Adelaide, Melbourne, Sydney, and other cities. See also N.Y. for later information.

As a political and constitutional entity Australia includes the island continent of that name, the island of Tasmania, and certain small adjoining islands. It is situated on the distant south-eastern fringe of the great Eurasian land mass between long. 113° 8' E. and long. 153° 39' E. and between lat. 10° 41' S. and lat. 39° 8' S., or (including Tasmania) 43° 39' S. The greatest width of the continent (from Steep Point in Western Australia to Cape Byron in New South Wales) is about 2,400 m. Its greatest length (from Cape York to Wilson's Promontory) is about 1,970 m.

Arms of Australian Commonwealth

The area, including Tasmania, is 2,974,581 sq. m., almost the same as that of the United States, about six times that of the Union of South Africa, twice that of the Indian sub-continent, and nearly 25 times that of the U.K. As

the Tropic of Capricorn passes through the continent at almost its greatest width, about 40 p.c. of its area lies within the tropics, and much of the centre is too dry for any but a very sparse and probably nomadic population.

TOPOGRAPHY, CLIMATE, FLORA AND FAUNA. Australia is roughly kidney-shaped, with the gulf of Carpentaria as the only large indentation in the northern convex. The concave southern coast-line is broken but not very deeply indented by Spencer and St. Vincent's gulfs. Vast areas are remote from the seas in a continent which lies in one of the world's dry belts.

The contours of Australia are remarkably uniform. The highest point, Mt. Kosciusko, is about 7,350 ft., but only about 5 p.c. of the whole continent is above 2,000 ft. West of a line from the gulf of Carpentaria to Spencer gulf, the country is a vast plateau or pene-plain from 600 to 1,500 ft. high. The backbone of eastern Australia is a tilted plateau or cordillera called the Great Divi-

ing Range, about 2,000 ft. high. Between them lies the Great Central Plain.

The western plateau comprises the central desert area, the tropical region in the N., and the S.W. corner. The central area is an almost waterless country of desert sandhill and desert steppe carrying some porcupine grass with mulga and saltbush on the outskirts. The northern tropical region includes the Kimberleys and Arnhem Land, where, although much of the soil is leached and podsolised, there are river flats of rich alluvium.

The characteristic vegetation is eucalyptus forest and tropical grasses in the N., with savannah and acacia scrub (mulga, myall, etc.) in the S. towards the desert. The S.W. is a temperate tableland region with a coastal fringe. Its easterly section is a mallee (scrub eucalyptus) belt, but towards the south there are wide belts of forest country with magnificent stands of jarrah and karri.

With the eastern cordillera must be considered the coastal



Australasia. Showing all the chief islands of the S. Pacific ocean, including Australia, comprised in this term. See page 784

strip and the western slopes. This region, extending from Cape York to the Murray mouth, has an average width of about 150 m. Much of the cordillera is really tableland country entirely lacking the more rugged contours of typically mountain country.

The coastal strip is well watered, and contains a number of valuable rivers, e.g. the Burdekin and Fitzroy in Queensland, and the Richmond, Clarence, Hunter, Hawkesbury, and Shoalhaven in New South Wales, as well as many lesser streams. Much of the western slope is savannah woodland with stretches of brigalow and Mitchell grass. Most of it is fairly well watered (15–30 ins. annual rainfall).

The Central Basin

The Great Artesian basin and Murray-Darling basin form the central plain into which many of the rivers that drain the western slopes disappear. The eastern margins are fairly well watered, but on the W. this area merges into the desert. The eastern section, with the western slopes of the tablelands, forms the vast grazing country of Australia—cattle in the north, sheep from Southern Queensland through New South Wales and Victoria. Since about 1870 considerable use has been made of the artesian water not only in these but in at least four other basins. Much of it is heavily impregnated with mineral salts, but most is fit for stock. Of recent years evidence has accumulated that these basins can be drawn upon too heavily.

The most important irrigation works are in the Murrumbidgee and Murray river valleys. For the large-scale irrigation scheme started in 1949, see Australia in N.V.

A map of the average annual rainfall shows a roughly elliptical area of over one million sq. m. with less than 10 ins. This area extends from near Wilcannia in New South Wales across South Australia and Western Australia, where the elongation of the ellipse is cut by the coast line around Shark's Bay. In the centre of the broadest part of the ellipse, i.e. around Lakes Eyre and Torrens in South Australia, there is a region where the average annual rainfall is less than 5 ins.

Around this arid centre are concentric belts of progressively wetter country as one moves outwards to the coasts. Less than 7 p.c. of the whole area has an

annual average of over 40 ins. There is a stretch of country along the north-eastern coast of Queensland where the isohyets do not conform to the general pattern and seem to belong to a different system. Between Port Douglas and Cardwell the annual average is from 142 to 165 ins.

N. of a line which cuts the continent transversely from just above Exmouth gulf in Western Australia to a point near Newcastle in New South Wales, most of the rain falls in summer, and S. of it in winter. Along the eastern coastal district the rainfall is distributed over the whole year. Over northern Australia, although the rainfall is sufficient, the fact that it falls in the summer months makes this part of the continent uncomfortable to live in and ill-suited for the crops and animals upon which Australian economy is built. Evaporation is relatively high over the whole continent in summer, so that in the northern regions the value of the rainfall is further reduced by this factor. Over the centre the potential evaporation is much higher than the actual precipitation.

The reliability of the rainfall is lower in Australia than in England and over about 80 p.c. of the continent is lower than in any part of Europe. Variability tends to increase with the distance from the coast, so that the central regions suffer not only from lack of rainfall but from its unreliability.

Native Fauna

Marsupials are to be found in every part of the continent. In the drier areas is the marsupial mole; over the grassland slopes and tablelands, kangaroos and wallabies. In the bush are the leaf-eating opossums and native bears. Bandicoots and wombats exist over most of the continent outside the tropics and away from the towns. The native cat is found all along the coast. Tasmania has two carnivorous marsupials in the Tasmanian wolf and Tasmanian devil, an animal that resembles a badger in size and shape.

The birds most peculiar to Australia are the emu, the bowerbird, and the lyre bird. The emu is the only one of these to be found in all parts. Other birds which do not confine themselves to any one region include the black swan, the bronze-wing pigeon, the wedgetail eagle, and the black duck. It is generally recognized, however, that the continent has three rather distinct ornithological regions, the N. and N.W., the S.E. (which in-

cludes the climatically similar south-western corner), and the interior.

Various species of bird and animal have been introduced. Some, most notoriously the rabbit, have become pests. The rabbit has destroyed the native shrubs and grasses and helped to turn wide areas into dust bowls.

Trees and Plants

The flora is immensely varied, and comprises over 10,000 species. Trees, predominantly eucalyptuses, of many kinds are often of enormous size. Shrubs, under-shrubs and herbs, parasites and saprophytes, and climbers, are to be found throughout the adequately rainy areas, while the desert is covered at times with brilliantly coloured flowers. The largest genera are *Acacia*, *Eucalyptus*, *Grevillea*, *Styphelia*, *Eriostemon*, *Melaleuca*, *Candollea*, *Hakea*, and *Hibbertia*. The most popular bush flowers are *Boronia*, wattle, flannel flowers, and waratah.

DISCOVERY. After much controversy it may now be taken as settled that the first discovery of any part of the continent was made when the Dutch vessel *Duyfhen* sailed along the W. side of the northern tip in 1606. Later the same year Torres, approaching from the Pacific side, discovered Torres Strait, but it is by no means certain that he ever caught a glimpse of the mainland of "New Holland."

In 1616 the Dutch E. India Co. prescribed "Brouwer's route" for ships sailing to Java. The use of the prevailing westerlies after leaving the Cape made it inevitable that sooner or later their vessels would come in sight of or run aground on the W. coast of the continent. By 1697 the S. coast from Cape Leeuwin as far as Nuyt's Archipelago (just beyond the border of Western and South Australia) and the whole of the W. and N.W. coasts had been seen by the Dutch. The most important voyage made for discovery during the period was that of Abel Janz Tasman in 1642. Sailing from Java, he discovered Tasmania, which he named Van Diemen's Land, and New Zealand.

The English or English-French period in the history of Australian discovery began with Dampier's visit to the N.W. coast in 1688. His *New Voyage Round the World* was a great travel book, but his account of Australia was not calculated to attract settlers. A second visit in 1697 added nothing to what was already known.

The Endeavour, Lieut. James Cook, was dispatched by the British government in Aug., 1768, ostensibly and primarily so that a group of scientists might observe the transit of Venus from a favourable spot. But Cook had instructions to make discoveries in the S. Pacific Ocean. After leaving Tahiti he circumnavigated New Zealand, then set out on a course which brought him in sight of the E. coast of New Holland on April 20, 1770.

COLONISATION. After the British loss of the American colonies a proposal was made to send United Empire Loyalists to the country Cook had discovered. This came to nothing; and it was the urgent necessity of relieving the overcrowded gaols of the United Kingdom that led eventually to the settlement of New South Wales (as Cook named the E. part of New Holland).

The instructions to the first governor, Capt. Arthur Phillip, specified Botany Bay as the most eligible situation known to the authorities, but Port Jackson was found to be a much better harbour, and Phillip landed his party of convicts and marines on the shores of Sydney Cove on the S. side of that harbour, Jan. 26, 1788.

Phillip's commission invested him with authority over all New Holland E. of 135° E., apparently because this seemed to be the line accepted by the Dutch as the eastern limit of their discoveries, although in fact their ships had been much further E. In 1824 Capt. Bremer in H.M.S. Tamar took formal possession of the N. coast between 129° E. and 135° E.; and in 1829 Capt. Fremantle took possession for the British crown of all New Holland not included within the territory of New South Wales. For some time there was a practice of referring to the continent east of 135° E. as New South Wales and to the rest of it as New Holland. Flinders seems to have been the first to urge the use of the name Australia, and governor Macquarie adopted the suggestion. The name came into official use gradually after 1820.

Van Diemen's Land, which was called Tasmania after 1856, was first settled when posts were established on the Derwent and Tamar Rivers in 1803 and 1804 to forestall the French, following Baudin's visit to Sydney in 1802.

Brisbane, later capital of Queensland, was established in 1824 as a subordinate penal settlement for hardened offenders from Sydney.



Australia. Some of the flowers indigenous to the continent. 1. Swainson pea (*Swainsona coronillifolia*). 2. Victorian Christmas bush (*Prostanthera lasiantha*). 3. Yellow kangaroo paw (*Anigozanthos flavidus*). 4. Black wattle, one of many species of acacia.

A small military post, to warn off the French, was established at King George's Sound in Western Australia in 1826, but the real foundations of that colony were laid when settlements were formed at Perth and Fremantle on the Swan River in 1829 by settlers from England. Abortive attempts were made in 1804 and 1826 to establish settlements in the Port Phillip district (Victoria after 1850), but the first permanent settlements were made at Portland in 1834 and at Melbourne in 1835 by people who crossed from Tasmania. South Australia grew up from the small beginnings at Adelaide in 1836 of a colony established on the Wakefield principles. (See Wakefield, E. G.) Its northern boundary was fixed at 26° S., but in 1863 the Northern Territory was added to it.

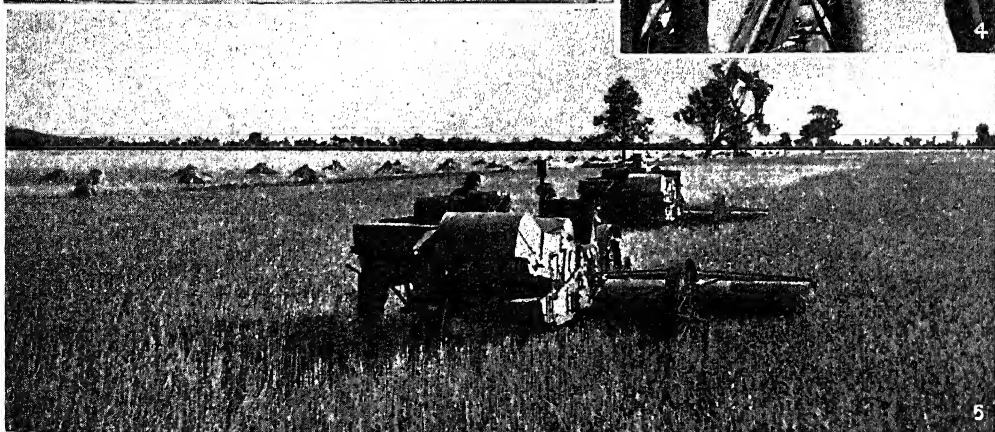
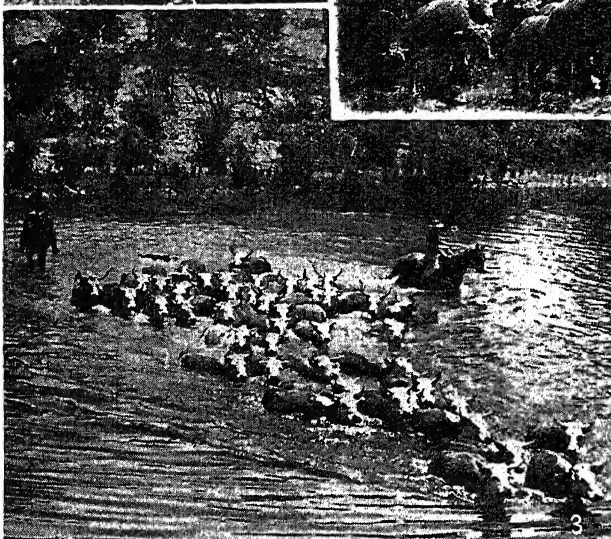
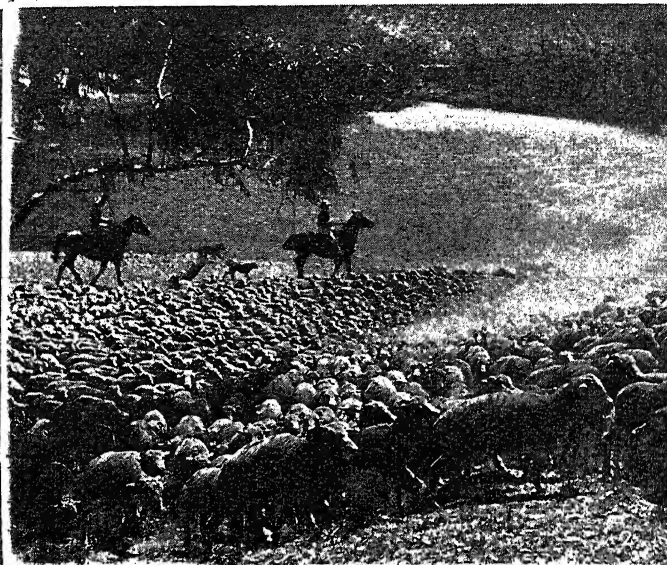
The first settlers in Australia were the convicts and their guards. Transportation to New South Wales was abolished in 1840, although a few shiploads of Pentonville "probationers" continued to arrive until 1850. Transportation to Tasmania ended in 1853. Western Australia did not receive convicts until 1849, and transportation to that colony continued until 1868. South Australia was never at any time a convict colony. From first to last possibly a little over 160,000 people entered Australia as convicts.

Some immigrants arrived in New South Wales as early as 1793, but

while the war with Napoleon lasted emigration was not encouraged. Until 1816 one might be sent to Australia if one were bad enough (and got caught), but to go of one's own accord required the production of evidence of character and substance. In 1819 the colonial secretary began to advertise New South Wales as a suitable place for immigrants, and land grants were offered as a bait. Assisted passages were first made available in 1831, and gradually a fairly steady stream of immigrants arrived each year. The policy of assisting immigrants was abandoned during the latter years of the 19th century, but was revived after the establishment of the Commonwealth.

The gold discoveries brought about the second colonisation. At the end of 1850 the population of the Australian colonies was 405,356. By the end of 1860 it had considerably more than doubled, at 1,145,585. The diggings attracted men with initiative, courage, and enterprise from all classes. The Australian of today is what results from a mixture of all the types of all the classes of the British Isles, with a very slight dash of the foreign element.

ABORIGINALS. From the various settlements established around the periphery the conquest of the interior was carried on by a process of infiltration or (largely peaceful) penetration. To this process the aboriginals could make

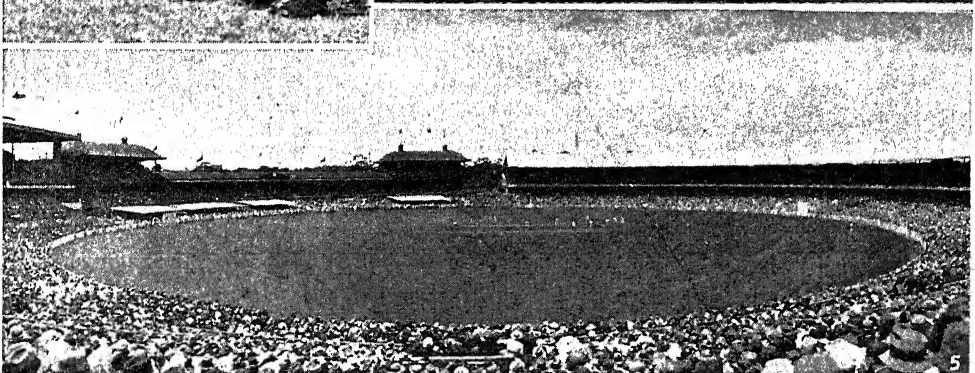
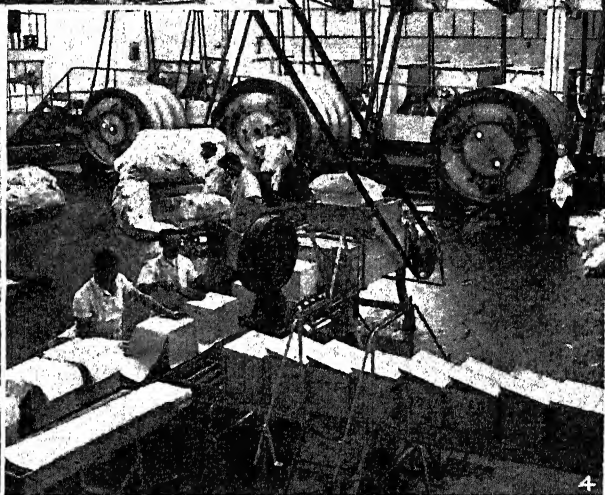
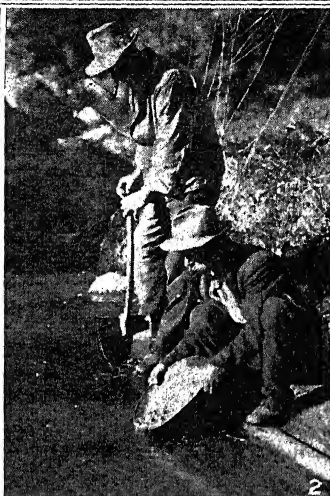
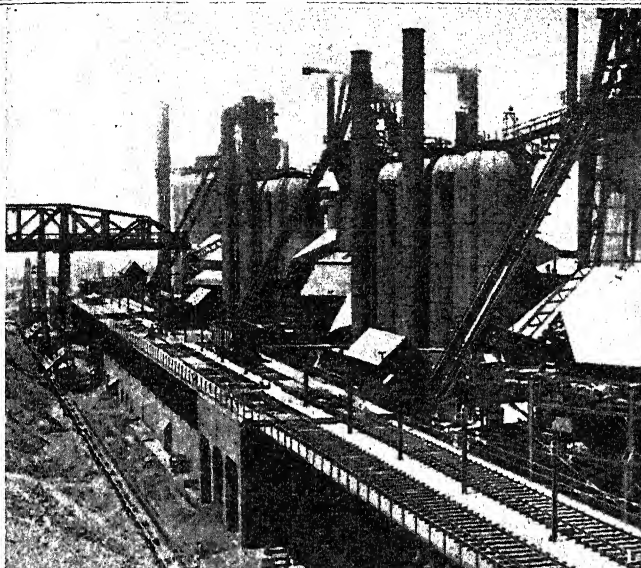


1. Large-scale shearing of sheep by mechanical clippers. 2. Rounding up some of the 100 million sheep of the Australian pastures. 3. Cattle, seen fording a river, are a valuable source of wealth. 4. Bags of wheat being stacked at Port Melbourne for shipment; a

mechanical elevator is used to make an enormous stack of 150,000 bags. 5. The auto-header harvester a machine invented in Australia, takes off the heads of the crop automatically, threshes and cleans it, and then pours it into 200-lb. bags on the machine

AUSTRALIA: THREE OF THE CHIEF SOURCES OF HER PROSPERITY

Photos, 1, 2, 3, and 5, Australian News and Information Bureau; 4, Fox



1. Steel works at Broken Hill, New South Wales. 2. Panning for gold at Warburton, Victoria; the total value of gold produced in Australia, since the discoveries of 1851 to the end of 1937, was approaching £700,000,000, nearly half of which came from Victoria. 3. Men of the

Australian Imperial Force in training. 4. Scene in a butter factory at Kommurra, Victoria; the Commonwealth does a vast trade in dairy products. 5. Scene at Melbourne cricket ground in 1937, while the Test Match between England and Australia was in progress

AUSTRALIA: SIDELIGHTS ON LIFE IN THE GREAT COMMONWEALTH

Photos, 1 and 5, Fox; 2, 3, and 4, Australian News and Information Bureau

very little effective resistance. There may have been 150,000, but they were scattered in small groups over the whole continent. Occasionally they speared sheep or cattle or attacked a homestead, but stone-age nomads could not stand up against the white man's firearms. Their social code was very complicated and highly efficient, but it disintegrated rapidly after contact with the whites. Pure-blooded aboriginals are almost extinct except in Queensland, the Northern Territory, and Western Australia, where there may be 50,000 left.

The aboriginal is not a negroid but a Dravidian, with some affinity to the Veddahs of Ceylon. The Tasmanians, now quite extinct, were negroid and more given to concerted hostile action. In 1890 governor Arthur tried to round them up, but the attempt proved a costly failure. (See Australian Aborigines).

INLAND EXPLORATION. The main geographical features of south-eastern Australia were known by about 1840 and of all eastern Australia by about 1863. The continent was not crossed from South Australia through the Northern Territory until 1862, and large areas remained unknown in Western Australia until 1880 or later. Until 1813 the settlers in New South Wales were confined to the coast district. Then the Blue Mountains were crossed, and the way was open to the drier interior. There were about 50,000 sheep in the colony in 1812. By 1821 the number had increased to 290,000. The merino had found his natural habitat.

Explorers of the Interior

In the gradual unveiling of the interior the most prominent parts were played by Lieut. Oxley, Allan Cunningham, Capt. Sturt, Maj. Thomas Mitchell, E. B. Kennedy, Ludwig Leichhardt, and Burke and Wills in Eastern Australia; by Sturt, E. J. Eyre, and McDouall Stuart in South and Central Australia, and by Capt. George Grey, J. S. Roe, the Gregory brothers, the Forrest brothers, and Warburton and Giles in Western Australia.

As hydrographic survey still continues, it may be argued that the detailed exploration of the Australian coast line is not yet complete, but maritime exploration on anything like the grand scale ended with the voyage of 1841 of H.M.S. Beagle. Tasmania was proved to be an island when George Bass and Matthew

Flinders sailed through Bass Strait in 1798. In 1801 Flinders, as commander of the Investigator, examined the S. coast and circumnavigated the continent. Much that he left to be explored on the N. and N.W. was visited by Capt. P. P. King between 1818 and 1821, and the small stretches still unknown were examined by the Beagle between 1837 and 1841.

POLITICAL HISTORY. New South Wales being established as a penal settlement, the early governors had wide powers; but as the number of free settlers increased, either by immigration or by expiration of sentences, these powers became increasingly inappropriate. Apart from a convict outbreak in 1804, easily suppressed, the only "rebellion" occurred when the officers of the New South Wales Corps and some of the free settlers deposed governor Bligh ("Bounty" Bligh). From 1819 to 1821 a special commissioner resided in the colony to report upon the system of government, and in 1823 an Act for the Better Administration of Justice not only remodelled the courts but provided for a small legislative council to advise the governor.

Legislative Councils

By an Act of 1828 the legislative council was enlarged to include non-official members. Van Diemen's Land had been promoted into a separate colony in 1825, and provision was now made for its own legislative council. Western Australia and South Australia were established, the former in 1829, the latter in 1836, under separate Acts. Western Australia did not obtain a council until 1832. South Australia was not converted into a crown colony possessing its own legislative council until 1842.

In 1842 representative government was introduced into New South Wales, and the Port Phillip district was given separate representation. As the control of the public lands was withheld and a part of the expenditure was reserved from the control of the legislature, agitation for responsible government began almost at once. An Act of 1850 provided for the establishment of a separate colony S. of the Murray River, and the Port Phillip district became Victoria. The same act empowered the local councils to draw up their own constitutions. By the end of 1855 constitutions drafted in the colonies came into operation in New South Wales, Victoria, and Van Die-

men's Land, and in 1856 in the colony of South Australia.

As the Moreton Bay district, Queensland remained part of New South Wales until 1859, when it became a separate colony with a constitution similar to that of the present colony. Western Australia received representative government in 1870 and responsible government in 1890.

These colonial-made constitutions were broadly similar in that they all provided for local self-government through a bi-cameral legislature and responsible executives. The legislative council was abolished in Queensland in 1922 and was made elective by both Houses voting as one constituency in New South Wales in 1934.

Land Settlement

Between 1860 and 1880 attempts were made to settle small farmers on the land by means of free selection. As a result, it was made evident that instead of a large number of small farmers the west and middle west (the drier areas) could carry only small numbers on large farms. One of the good results of the land agitation of the sixties was the introduction of the Torrens system of lands titles registration first adopted in South Australia in 1863.

Pastoral holdings in the low rainfall areas are usually held under lease with almost nominal rentals, while land suitable for agricultural purposes is mostly freehold or is being acquired by some form of conditional purchase.

One of the outbreaks of mob violence during the period of the gold rush is given a kind of symbolic importance by certain elements in Australia. Mainly because they objected to the payment of fees for a gold digger's licence, quite a formidable body of men camped behind a stockade on Bakery Hill, Ballarat, in Oct., 1854. One incident led to another, and they declared for the establishment of a republic of Victoria. Five soldiers and 20 or more miners were killed and a good many others injured when at length the military attacked the stockade and dispersed the rebels.

Other outbreaks of mob violence occurred when Chinese appeared in considerable numbers on some of the diggings. After the abolition of transportation in 1840, attempts had been made to import Chinese and other Asiatics, and popular feeling had been aroused. The White Australian policy was not therefore born on the diggings, but it was well nourished there.

Acts were passed in all the colonies from time to time between 1856 and 1880 to restrict Chinese immigration, and in 1896 it was decided to apply to all Asiatics the restrictions hitherto applicable only to the Chinese. The Bills were reserved, and at the Colonial Conference held in London in 1897, Joseph Chamberlain expressed sympathy with colonies that had to live in close proximity to hundreds of millions of Asiatics, but recommended the method of the dictation test incorporated in the Natal Act No. 1 of 1897 as less likely to be offensive.

One of the first Acts passed by the newly constituted Commonwealth parliament was the Immigration Restriction Act of 1901, and Chamberlain's suggestion was adopted. Representations by the Japanese government led to an amendment in 1905 whereby "any prescribed language" replaced "any European language." As the law stands, any intending immigrant may be required to write at the dictation of an officer 50 words in any prescribed language and there have been occasions on which Europeans have been required to satisfy the test.

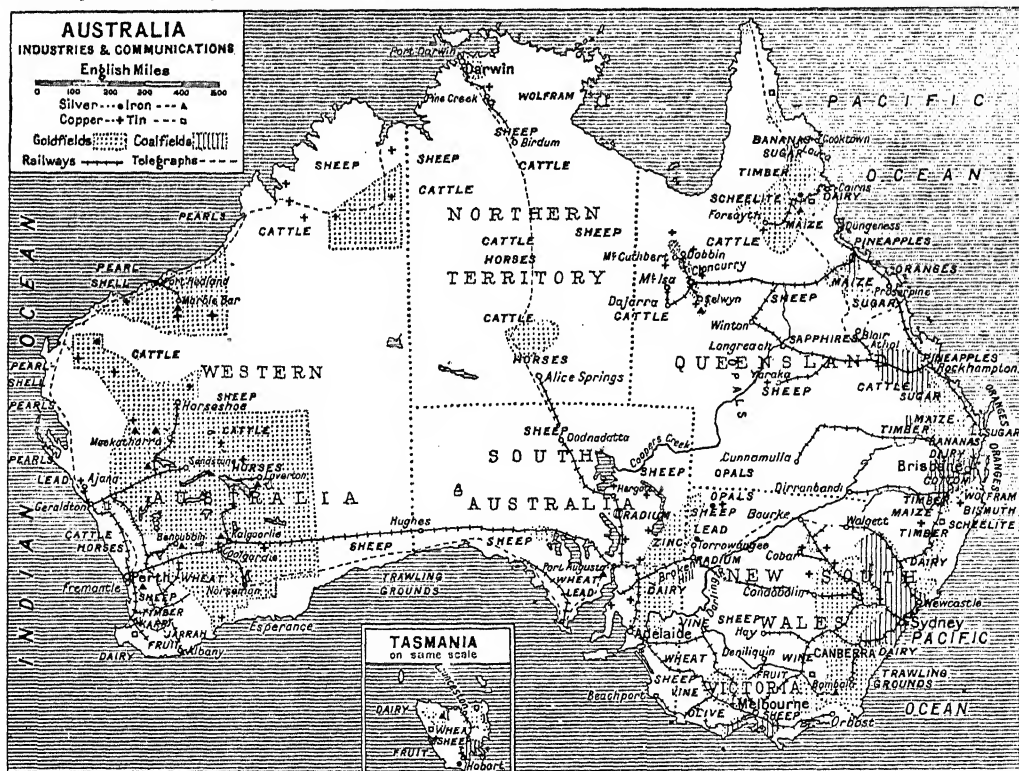
Although the workers demonstrated against the importation of coloured labour and there were small unions as early as 1830, the continuous history of trade unionism in Australia begins about 1850 among the craftsmen of the building trade. By 1874 trade unionism on English craft lines was well established, and it was possible to form an Australian-wide association of miners. In 1894 the Australian Workers' Union was formed, a union which ignored craft lines, and was as wide as the continent. In the meantime, William Lane had made his influence felt on labour thought and a Trades and Labour Council had been formed in Brisbane. Gradually the unions in each main industrial centre were linked together, and in 1927 the Australasian Council of Trade Unions came into existence to function on behalf of all unions in dealing with inter-state industrial disputes or those affecting the movement generally.

The failure of the maritime strike of 1890 led the unions to attempt political action. In 1891 the New South Wales Labour Electoral League formulated the

first labour platform, and on the first opportunity thereafter Labour candidates were offered at the elections. The Labour party has proved itself to be a power to be reckoned with ever since.

The Australian colonies grew up apart, and in course of time vested interests were established in things as they were. In spite, therefore, of the obvious advantages of some form of union for purposes of defence and the removal of trade barriers, various attempts to bring the colonies to accept a common authority failed until a popular movement forced the hands of the politicians and a constitution was drafted. On its first submission to the people this constitution failed to secure the prescribed majority and had to be amended, mainly to ensure that although the Federal Capital might be in New South Wales, it should be at least 100 miles from Sydney. Even after the Commonwealth was established, over 26 years elapsed before the Parliament sat in Canberra, the Federal Capital.

PRESENT CONSTITUTION. The Commonwealth of Australia was established by proclamation as from Jan. 1, 1901. The Federal



Australia. Map of the great southern continent indicating localities of the chief industries, railways, and telegraphs

Parliament consists of the King and two Houses, a Senate and a House of Representatives. The original states have equal representation in the Senate, and in the House of Representatives they are represented proportionately to their populations, except for a proviso that no original state may have fewer than five members. The Northern Territory has a representative without a vote except on matters directly affecting the Territory. Parliaments are triennial, but Senators are elected for a six-year term on a rotational system whereby half the representatives of each state must retire every three years. In the event of a deadlock between the two Houses the Governor-General may dissolve both Houses simultaneously. Executive power is vested in the King and is exercisable by the Governor-General and an executive council responsible to parliament—in other words, the cabinet system, closely modelled on the U.K. pattern, operates in the Commonwealth as it does in the individual states. The judicial power is vested in the High Court of Australia, such other federal courts as the parliament creates, and such other courts as it invests with the federal jurisdiction.

Commonwealth's Veto

The constitution provides for the transfer of certain powers to the Commonwealth, the residuary powers remaining vested in the states. The transferred powers are specifically enumerated or exist by necessary implication. Some are exclusive, *i.e.* exercisable only by the Commonwealth, *e.g.* the power to levy customs and excise and to pay bounties; but most are concurrent, *i.e.* exercisable by the Commonwealth or states, subject to a provision that where a law of a state is inconsistent with a law of the Commonwealth, the latter shall prevail.

The constitution is alterable by referendum after the proposed amendment has been passed by both Houses of the Parliament or twice by one House with an interval of not less than three months between the two passings. At the referendum the proposed amendment must be acceptable to a majority of all the voters in the Commonwealth and to a majority of voters in a majority of the states. Numerous proposals for amendment have been placed before the people with very little result. One important amendment of which the implications were imperfectly realized was made in

1928 when the Commonwealth was empowered to enter into financial agreements with the states and a loan council was established.

In the first Federal parliament Edmund Barton was prime minister and leader of the Liberal protectionists. G. H. Reid was head of the official free trade opposition. There were also 16 Labour members prepared to employ the old tactics well tried in the colonies (now states), of support in return for concessions. This policy was particularly effective after Alfred Deakin succeeded Barton in 1903, but after two very brief terms in office in 1904 and 1908, Labour came to both office and power in 1910. Since then, federal politics has meant the same struggle between Labour and anti-Labour as goes on in the states.

Political Parties

Until 1917 the opponents of Labour were Liberals (or Independents). In that year the Labour party split over the conscription issue and its prominent leaders joined with the opposition members to form the national war government, and a Country party appeared for the first time in Federal politics. In 1931 the national party, anxious to allay any suspicion that it was a class party, renamed itself the United Australia party, and for some time was able to hold office in coalition with or with the support of the Country party. The U.A.P. has now reverted to the old title, and once more there is a party calling itself Liberal.

No party in Australia will call itself Conservative, and few people admit that they ought to be so described. The Communist party is active and influential rather than numerous.

Labour defeated the U.A.P. and Country party in 1929 just in time to inherit the depression. The Labour premier of New South Wales adopted a policy which seems to have reacted adversely on Labour everywhere, and in 1932 the other parties came to power. In Oct., 1941, two months before the Japanese attack on Pearl Harbour, the Labour party returned to office under John Curtin (*q.v.*), who was succeeded after his death in 1945 by J. A. Chifley. The elections of 1946 confirmed Labour's power for a further term.

The constitution, said Alfred Deakin, left the states financially tied to the chariot wheels of the Commonwealth. How true this was, time has increasingly revealed, and the revelation is not

yet complete. The Commonwealth may levy any form of taxation, whereas the states may not levy duties of customs and of excise. The states therefore lost one of their principal sources of revenue, but retained many of the very expensive functions of government, such as education, police, etc. For the first ten years the states were to receive not less than three-fourths of the net revenue from customs and excise, and by Section 96 the Commonwealth may grant financial assistance to any state or states. When the ten years' period expired, the Parliament passed the Surplus Revenue Act, providing for payments to the states of 25s. per head of population. These *per capita* payments continued until the financial agreement by which the Commonwealth took over state debts as at July, 1929, and made a large annual contribution towards the interest bill. Future borrowing was placed under the control of a loan council, on which the Commonwealth has two votes and casting vote.

In 1942 the uniform income tax plan was imposed by parliament. Under this plan the Commonwealth collects the income tax and the states receive specified annual amounts so long as they abstain from imposing an income tax. The plan was in effect imposed upon the states, and the ensuing litigation has served to make it at least probable that the Commonwealth can, if it wishes, continue the plan after its need as a defence measure has ceased.

Disadvantages of Federation

Federation brought incalculable benefits, but its burdens do not fall with equal weight upon all the states. High protection, for example, helps the industrialised larger states more than the primary producing smaller states. The Navigation Act operated, so it is generally agreed, to the special detriment of Tasmania. For many years Western Australia, South Australia, and Tasmania have been chronically unable to balance their budgets without the special grants the Commonwealth is able to make under Section 96 of the constitution. There is, however, a tendency on the part of the weaker states to blame federation for all the shafts of fate. This is well illustrated by the Secession Referendum of 1933 in Western Australia. The state was suffering from the depression and voted for secession. But as the depression passed, the people tended to forget

that they had ever cast a vote against federation with their fellow Australians.

Quite early in its history the Labour party wanted a national bank. The Commonwealth Bank was established in 1911 with an original capital of £1,000,000, to be raised by the issue of debentures. In fact, the bank began operations on a small loan from the government, and the debentures were never issued. The bank was remodelled from time to time until in March, 1945, the Treasurer introduced a bill to make it a true central bank, although a separate division of the bank was to be permitted to engage in general business. It can now control the volume of credit, bank interest rates, foreign exchange, and the gold reserve. The administration rests with the governor, who is assisted by an advisory council on all matters concerning monetary and banking policy.

The question of the financial relations between Commonwealth and the states has attracted but intermittent popular attention. But the tariff has been almost constantly dragged before public notice, for particular interests are vitally affected. The important feature of the first federal tariff (1902) was that it was essentially a revenue tariff, the schedules being arranged to provide some protection for infant industries.

"New Protection"

The first important revision was made in 1908. To secure Labour support for a thoroughly protective tariff, Deakin put forward his scheme of "new protection," whereby some of the benefits conferred on manufacturers by the tariff should be passed on to consumers and workers. The Industries Preservation Act of 1906 provided for high duties on agricultural machinery. The Excise Tariff Act provided for duties on locally made agricultural machinery, which could be remitted if the manufacturer could produce a certificate from the federal arbitration court that he was paying "fair and reasonable" wages. The whole scheme broke down eventually when tested before the high court, but in the meantime, Mr. Justice Higgins, of the federal arbitration court, had been asked to give a certificate to one of the manufacturers of agricultural machinery and had had to decide what was "fair and reasonable." He took as his standard "the normal needs of the average employee regarded as

a human being living in a civilized community." This was not the first, but it was in many ways the most important, declaration of the principle of the living wage as the basic wage below the level of which wage rates could not be allowed to fall.

Until the Ottawa agreements were ratified, the tariff level rose at each revision. A special committee appointed by S. M. Bruce in 1929 had warned that "excess costs" were considerable, but soon afterwards the depression came to dominate economic policy. As a result, since 1932 many duties have been reduced.

Free trade is not an issue in Australia. There is general agreement that the tariff should be used to foster local industry but that its level should be determined only after parliament has considered in detail the careful reports and recommendations furnished by the tariff board.

INDUSTRIAL ARBITRATION. The maritime strike of 1890 showed the people and the colonial parliaments that union affiliation on the one hand, and concerted action among employers on the other, had developed to the point where an industrial dispute was apt to become an event of national importance. During the 1890s the parliaments intervened merely to the extent of providing machinery for conciliation, although an ineffective Act embodying the principle of compulsory arbitration was passed in South Australia in 1894, mainly as the result of the efforts of C. C. Kingston, afterwards a distinguished member of the Commonwealth parliament. By 1901 it had become quite apparent that conciliation did not secure industrial peace, and an Act for compulsory arbitration was passed in New South Wales. Gradually the principle of compulsory arbitration was adopted, with or without wages boards and other machinery for conciliation, in all the states.

Conciliation Courts

The Commonwealth court of conciliation and arbitration began to function in 1905. The Commonwealth's power is limited by the constitution to "conciliation and arbitration for the prevention and settlement of industrial disputes extending beyond the limits of any one state." The court therefore has jurisdiction only where there is a dispute, and where the dispute involves parties in two or more states. Its awards bind only the parties to the dispute since the

court has no power to make a "common rule" except for industries in Federal territory.

Employers and employees not bound by Commonwealth award are subject to state control, but any state law, or award of a state court, that is inconsistent with a Commonwealth award, is invalid to the extent of the inconsistency. In other words, a Commonwealth award is paramount.

As a result of this dual system, there is some conflict of industrial authority, and there was at one time a good deal of overlapping. Most of the worst difficulties have been overcome. If the system breaks down, it will not be because it is too intricate or too clumsy, but because one side or the other challenges successfully the power of the state to enforce the decisions of the courts.

EDUCATION, ETC. Each state has its university, and there is a university college at Canberra. The universities are supported partly by grants from the governments, partly by fees and endowments. Control is vested in a senate or council for each. Before the outbreak of war the total enrolment was in the vicinity of 12,000. Between 75 and 80 p.c. of all children attending school are enrolled in public (i.e. state) schools. These are of all grades, nursery or kindergarten, primary, various types of post-primary, and secondary and technical. Education is free, compulsory, and non-sectarian. The school-leaving age in New South Wales is 15 years, in all other states 14 years. Illiteracy is almost unknown. Public interest in the school system is keen, and a great deal of thought is devoted to making it efficient.

Social Services

Social services are varied and well developed. The states are mainly responsible for assisting or establishing hospitals, infant welfare centres, and schools. Old age pensions, invalid pensions, maternity endowment, etc., are provided by the Commonwealth. The Commonwealth also makes itself responsible for certain important branches of research, e.g. the Council for Scientific and Industrial Research, the Australian Institute of Anatomy, the Commonwealth Solar Observatory, and the Commonwealth Bureau of Meteorology. The Australian Council for Educational Research has a Commonwealth endowment. There is no established or state-aided church in any state of the Commonwealth.

LITERATURE, ART, MUSIC. When it is realized that a little over a hundred years ago Australia was a penal settlement and that for the greater part of its short history the national energies have been absorbed in the struggle with a strange and intractable environment, Australian contributors to art and literature will be seen in better perspective. The early artists, of whatever medium, endeavoured to see Australia through English eyes and to judge its life by English standards. The result may have been art, but it was not Australian. Kingsley's *Geoffrey Hamlyn* (1859) and Marcus Clarke's *For the Term of His Natural Life* (1870-72) are usually recorded as the first great Australian novels. Rolf Boldrewood's *Robbery Under Arms* is not as good a book, but has more of the Australian landscape. A number of Australian writers have enjoyed a considerable vogue, and some have produced work of lasting value. Steele Rudd's *On Our Selection*, though not strictly a novel, is a humorous presentation of life as it was lived on the small selections in the pioneering "free selection" days. Mrs. Aeneas Gunn's *We of the Never Never* and *The Little Black Princess* are good studies of life in the Northern Territory. Ada Cambridge, Tasma, Ethel Turner, Edward Dyson, Katherine Susannah Pritchard, Brent of Bin Bin, Henry Handel Richardson, and the two women who write under the name of M. Barnard Eldershaw all deserve mention.

The best known of the early attempts at poetry were those of Barron Field, friend of Charles Lamb, the judge of the New South Wales supreme court, but the earliest true poet born in Australia was Charles Harpur. His best work was *The Creek of the Four Graves*. Henry Kendall was a musical lyrist, but over-imitative of the English models. Adam Lindsay Gordon's *The Sick Stock-rider* was one of the best of the earlier ballads, though never so popular as those of A. B. Paterson and Henry Lawson. The latter

will also be remembered. Christopher Brennan is a contemporary poet of the elect whose symbolism makes him incomprehensible to the many.

It is only within comparatively recent times that painters have been able to reveal the peculiar beauties of the Australian landscape. Art in Australia owes much to Tom Roberts, Conder, and Streeton and to such teachers as Bernard Hall, Max Meldrum, and Julian Ashton. Hans Heysen, Blamire Young, J. J. Hilder, and Elioth Gruner have produced landscapes of great charm and delicacy. Etching has been practised with skill and distinction by Sydney Ure Smith, Lionel and Norman Lindsay, and others, and portrait painting by Lambert, Longstaff, McInnes, and William Dobell. The best known Australian sculptor was Sir Bertram MacKennal, R.A. Phil May, though not an Australian, did some of his best work in Australia, and Will Dyson, born at Ballarat, and David Low, a New Zealander, first established their reputations in the Commonwealth.

Several Australian singers have attained fame. The most famous name is that of Dame Nellie Melba, but Florence Austral, Marjorie Lawrence, Peter Dawson, and John Brownlee are also worthy of note.

Population, Commerce, Communications

The following were population figures estimated in 1945:

N.S.W.	2,893,656
Victoria	2,010,927
Queensland	1,075,787
South Australia	627,490
West Australia	489,691
Tasmania	247,379
Northern Territory	5,220
Federal Capital Territory	14,691
Commonwealth	7,364,841

The immense developments which took place during the Second Great War render many pre-war statistics largely obsolete, while statistics of the war period are of uncertain significance as pointers for the future. Certain lists have been selected as representative of the pre-war position. External trade for year ended June 30, 1939:—

Imports Sterling	Exports Sterling	Total Sterling	Value per inhabitant		
			Imports £ s. d.	Exports £ s. d.	Total £ s. d.
£99'3 mill.	£96'4 mill.	£195'7 mill.	14 6 9	13 13 3	28 5 0

was not only a genuine poet but a short-story writer of outstanding talent. Bernard O'Dowd, John Farrell, and George Essex Evans

As to exports, normally about 90 p.c. of the wool, 80 p.c. of the wheat, and appreciable proportions of meat, dairy produce,

dried fruits, and other primary produce have to be marketed outside Australia. About 50 p.c. of all Australian exports go to the United Kingdom; 16-20 p.c. normally go to other European countries; 11-14 p.c. to U.S.A., Canada, New Zealand, and South Africa; about 5 or 6 p.c. to other countries. Of the principal exports, from 30 to 40 p.c. of the wool, from 50 to 60 p.c. of the wheat, and from 80 to 90 p.c. of the butter and cheese exported go to the United Kingdom.

Of imports, about 40 p.c. of all kinds come from the United Kingdom; Australia usually ranking third among all countries buying British goods. About 5 p.c. of Australian imports used to come from Japan and about 12 p.c. from the United States.

Comparative figures of revenue and expenditure in the pre-war quinquennium are shown in the table on page 795.

In these years there were 27,165 m. of rly. open and 562,271 motor vehicles registered. There were 296 air line aircraft, flying 14 million m. a year and carrying 147,919 passengers, 1,734,644 lb. of goods, and 470,375 lb. of mail.

In 1938-39 the wool crop totalled 985 million lb., valued at £43,700,000. from about 113 million sheep. Australia has about one-sixth of the world's sheep, and provides about one-quarter of the world's wool and about half its fine quality merino wool.

THE FIRST GREAT WAR. The first Commonwealth Defence Act, 1903, made all males between 18

and 60 years of age liable for military service. In 1911, universal military training

was introduced following a report by Lord Kitchener. Until 1913 Australia had paid a naval subsidy to Great Britain, but in that year the battle cruiser *Australia* and two cruisers, *Sydney* and *Melbourne*, arrived to form the nucleus of the Royal Australian Navy.

At the outbreak of war in 1914, therefore, Australia had a fairly complete military establishment and a small but up-to-date fleet, and was able to render valuable aid to the Empire. The ships served in every quarter of the globe, about 328,000 men served overseas. Casualties sustained represented 68 p.c. of enlisted men. War expenditure exceeded



£600,000,000. German colonial possessions in the Pacific were occupied. The German raider Emden was destroyed in a duel with H.M.A.S. Sydney. The Australians served with their

part in patrol work, mine-sweeping, coastal bombardment, etc. Australian airmen in British planes were over the beaches at Dunkirk and took part in the battle of Britain.

(a) Revenue :

Year	All States	Commonwealth	Total
	£	£	£
1934-5	97,372,643	75,956,078	173,329,321
1935-6	102,227,546	81,923,489	184,151,035
1936-7	109,075,492	82,775,120	191,850,612
1937-8	116,193,354	89,416,077	205,609,431
1938-9	115,993,501	95,001,628	210,995,129

(b) Expenditure :

Year	All States	Commonwealth	Total
	£	£	£
1934-5	110,773,219	65,280,561	176,033,780
1935-6	115,147,782	67,983,128	183,130,910
1936-7	119,492,741	71,445,401	190,938,142
1937-8	126,241,129	75,894,537	202,135,666
1938-9	129,563,948	84,674,147	214,238,095

Australia. Revenue and Expenditure for five years before the Second Great War

brothers - in - arms from New Zealand as the Anzacs at Gallipoli. They fought at Pozzières, Mouquet Farm, the Ypres Salient, Bullecourt, Messines, Passchendaele, and Villers-Bretonneux. As a compact army under their own general, they shared in the final great offensive which broke through the Hindenburg line. Meanwhile, the Anzac mounted division was fighting in Sinai and Palestine, and small detachments were in Mesopotamia, N. Russia, and the Caucasus.

THE SECOND GREAT WAR. In 1939 Australia had little more than a skeleton of a military establishment, and a navy consisting of 5 modern cruisers (including H.M.A.S. Perth, just then being taken over), 1 old cruiser, and 5 last-war destroyers. The country had no really modern aircraft. In June, 1945, the effective strength of the Australian forces (army, navy, and air force) was estimated at 548,000; by that time 92,000 casualties had been sustained.

Australian troops were in the Middle East early in 1940. They fought in North Africa, Greece, and Crete, and played a notable part in the siege of Tobruk and at the battle of Alamein.

The Royal Australian Navy was in the Mediterranean and Indian Ocean before fighting against the Japanese. In the Mediterranean H.M.A.S. Sydney destroyed the Italian cruiser Bartolomeo Colleoni by gunfire and damaged the Barde Nere, a sister ship. The Australian destroyer Stuart sank two Italian cruisers in a midnight attack near Matapan. Others took

After the entry of Japan into the war Australian troops fought in Malaya, at Singapore, in New Guinea, Timor, New Britain, the Solomons, Borneo, and elsewhere.

The navy took an important part in the defence of Indonesia and assisted the American fleets in all parts of the south-western Pacific. H.M.A.S. Sydney was mysteriously lost in 1942 after or while destroying a German raider. The cruiser Perth was sunk during a battle in the Strait of Sunda and the Canberra was lost in the Solomon Islands. The sloop Yarra and the corvette Armidale were also lost after doing good service. H.M.A.S. Australia was badly damaged in the Philippines.

What there was of the Australian air force was nearly destroyed when the Japanese attacked New Guinea and New Britain; but a considerable force well equipped with modern planes was in existence when the war ended, having harried the Japanese wherever they could be reached. Australia also contributed her quota to the Empire Air Training Scheme.

The war led to an immense development of Australia's secondary industries. At the cost of £250,000,000, 45 new factories and 178 government controlled annexes were built and it is estimated that 900,000 people were engaged in industries directly related to the war effort. Australia produced field guns, anti-tank guns, 4.7-inch naval guns, anti-aircraft guns, 20-mm. aircraft cannons, Bren guns, and mortars. Australian types produced were the 25-pdr. short field gun for

jungle use, the Austin sub-machine gun, the Owen sub-machine gun, and the Australian cruiser tank. New industries established included the manufacture of ball-bearings, extraction of nitrogen from the air, production of magnesium, optical glass, stainless steel, tungsten carbide tool tips, zircon for steel hardening, aero-engines and aircraft. The cost of the war to Australia was £2,111 millions. In 1947 it was announced that the Australian forces would be: navy, 26 ships in commn. (79 in reserve); army, 19,000 men; air force, 16 sqdns. Research on rocket weapons was begun at Woomera (*q.v.*).

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Australian Aborigines. Primitive race found inhabiting the Australian continent by its European discoverers. The present number of these "blackfellows" probably does not exceed 50,000. Their arrival in a remote past is deduced from their physical characters, primitive culture, diverse and undeveloped speech, and the absence of words for numbers beyond four. There are no stratified remains, but extensive kitchen-middens are not unknown.

In Australia a primal occupation by an Eolithic race, entering from the N. before the frizzy-haired Papuan was specialised, seems to have been followed by a Palaeolithic race, perhaps Mousterian, who crossed pre-Dravidian India and left the Veddas behind them. They brought with them no pottery, bow and arrow, domesticated plant, nor animal—except, perhaps, the warrigal or dingo—and no specialised tool except the womera, or spearthrower, and another weapon afterwards developed into the boomerang. They drove the older people into the S.E., with some intermingling, but no serfdom, until these crossed Bass strait and survived as the Tasmanians. The northern tribes were influenced culturally from Malaysia.

The uniformity of the physical type supports this view. Prominent brow-ridges, receding forehead

broad-based nose with notched root, thick lips, long-headed skull, small brain, tall stature, are paralleled in prehistoric Europe; chocolate-brown skin, wavy or nearly straight black hair, and other Caucasian attributes may also be palaeolithic. The flat-headed skull and other primitive characters are most marked in the south.

The food quest of these nomadic hunters was conditioned from the first by the lack of domestication. Wild roots need no implement but the women's digging stick. Moths and grubs are of importance in the dietary. Fish and emu may be poisoned by pituri, from a narcotic plant allied to tobacco, whose place it takes in the aboriginal life. While human flesh was never a regular article of food, all the motives for cannibalism are represented. Ignorant of metals, the local technologist developed some neolithic features, such as the polished axes of the Arunta, bone awls, shell cutters, wood shields, and fanged spears. Clothing, if used, may comprise a hair net and a fur tassel or a shell, held in place by a grass or hair cord, although even these may be used only at the corroboree.

In the S. a winter cloak of bark or skin may be used. Ornament includes a film of fish oil or a pattern of ochre, a kangaroo-tooth necklet, or a bushy tail in the hair. Savage ornament easily passes into mutilation, such as the nose-pin and the removal of teeth, both affecting language by eliminating such consonants as f and s. Dwellings are usually little more than wind-screens, barked or leaved, with the occasional use of caves. The seamless bark canoe is characteristic; the sewn bark canoe, like the outrigger, is due to Melanesian infiltration.

The "Bora" Ceremonies

Initiation into adult life occurs at the 'bora' ceremonies. To the mutilations already mentioned should be added scar-tattooing, circumcision, and for the central area a severer rite unknown elsewhere. The bora ground is specially prepared with earth reliefs of tribal animals and other devices, whose secret meaning is disclosed to the novices, the women being warned to avoid the mysteries by the divine voice of the bull-roarer. The tribal areas are small, and may exceed 200, each having its headman and informal council, hereditary chiefs being rare. Most tribes are divided into two phratries, whose members may not intermarry, and the further subdivision of each phratry into two or four classes limits the marital choice still more. These classes

may have been designed to secure, not exogamy as such, but a fair distribution of the food stock.

Each member of a tribe has a totem usually chosen from the animal world, but in the N. tending to include plants, and the rule forbidding the indiscriminate use of one's totem as food reflects its animistic side. For invitations to bora or corroboree message-sticks are used whose memory-aiding signs suggest the threshold of writing. The ground-drawings prepared at initiations have a magical intention, like the designs that adorn the churinga. But in several places mural paintings of animal and human forms, with scenic compositions—some recent, some of unknown age—together with stencilled hands, recall the art of prehistoric Europe.

Practice of Infanticide

The practice of infanticide, under the impulse of hunger or tribal usage, is not inconsistent with kindness and affection. Woman is a chattel, and owes little to ancestral matriarchy. The customs attached to the disposal of the dead—in tree, earth, or cave—with smoke preservation and cremation here and there, attest an inherent belief in an after-life. The religion is a low animism with some magical adjuncts, which find their expression, as among the Warramunga, in much ceremonial pantomime. There is no fetishism, prayer, or sacrifice; but a copious mythology has been claimed, especially in the S.E., to betoken a more or less inarticulate recognition of an All-Father. See *Anthropology*; Man. See illus. p. 41.

E. G. Harmer
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Australian Alps. Mt. range in S.E. Australia. It extends for roughly 300 m. from Melbourne to the federal capital at Canberra. The S. portion, in Victoria, to which the name is more strictly applied, is a wide plateau with heights, Bogong 6,508 ft., Feathertop 6,300 ft., Hotham 6,100 ft., Buller 5,930 ft.

N. of the border within New South Wales the plateau narrows, and the names Snowy Mts. and Kosciusko Massif are applied to the more elevated S. portion. Here Kosciusko, 7,328 ft., and Townsend, 7,260 ft., near the head-waters of the Murray river, are the main heights. The whole area is snow-

capped in winter, and snow lies in the sheltered hollows near the tarns most of the year. Overlooking Canberra, Bimberi rises to 6,264 ft. The S.W. portion is known as the Great Dividing Range, and still further W. as the Pyreneces.

The whole system is due to erosion, the mountains being technically known as residuals or mountains of circumdenudation. The uppermost rocks of the present peaks are the remnants of a plain that was formerly continuous between them. This plain gradually rose and, as it rose, the original river system carved out valleys, which were cut down steadily as the plain was elevated. The Australian Alps are thus a dissected peneplain, and in this regard resemble the Grampians of Scotland. They form part of the Main Divide, which forms the watershed between the short rivers, such as the Snowy river, which flow to the E. and S.E. coasts, and the great fluvial system of the Murray-Darling. Both the Murray and the Murrumbidgee have their source in the Kosciusko Massif.

The range has many forested areas, chiefly yielding giant eucalypts, and provides Australians with opportunities for winter sports, while the scenic beauties, limestone caverns, and other natural attractions make the Australian Alps a popular resort of tourists.

Australian Bight, GREAT. An opening of the ocean S. of Australia. From Cape Arid in W. Australia to Eyre Peninsula in S. Australia the bight forms an arc 1,600 m. in length, although the distance straight across the water is but 700 m. In S. Australia, W. of the head of the bight, the coast is a limestone scarp varying in height between 150 and 250 ft.; eastwards to Fowler's Bay there are hills of blown sand which reach a height of 180 ft.; in all this stretch of over 300 m. there is neither anchorage nor landing place. E. of Fowler's Bay the coast consists of a series of headlands, bays, islands, and inlets with submerged reefs. Here is Streaky Bay, the only safe anchorage in the bight. In the bight itself the continental shelf is wide, extending roughly 200 m. from the coast; beyond it the ocean floor drops in the next 200 m. from 100 to more than 3,000 fathoms to a great ocean trough, Jeffrey's Deep. Eucla, Eyre, Elliston, and Flinders are small settlements.

Australian Feather-Palm (*Archontophoenix*). A small genus of tall palm trees with straight, unarmed stems and large feather-like leaves. The Ilawarra Palm (*A. Cunninghamia*), a native of Queens-

land and New South Wales, grows to a height of 70 ft. to 80 ft. *A. Alexandrae*, a native of Queensland, closely resembles the first species, but differs in having pink flowers; in *A. Cunninghamia* they are dull yellow.

Australian Flights. The first aeroplane flights to Australia from the U.K. and America were made by Australians. The initial flight was made by Capt. Ross Smith, Lieut. Keith Smith, Sergeants W. H. Shiers and J. M. Bennett, in a Vickers Vimy bomber. Leaving Hounslow airport, London, on Nov. 12, 1919, they reached Port Darwin on Dec. 10, winning the prize of £10,000 offered by the Australian government for the first flight by Australians between England and Australia within 30 days. Flying in 24 stages, they averaged 82 m.p.h. over the 11,060 m. Both officers received the K.B.E., and the sergeants the A.F.M. The aircraft flew on to Sydney, Melbourne, and Adelaide.

The first double flight between the U.K. and Australia (5 weeks) and return (27 days) was made in 1926 by Alan J. Cobham (afterwards created K.B.E.) and a mechanic, in a D.H.50.

The first passenger light aeroplane flight to Australia was made between Oct. 14, 1927, and March 19, 1928, by Capt. W. N. Lancaster in an Avro Avian, with Mrs. Keith Miller as passenger. Meanwhile, in Feb., 1928, H. J. L. (Bert) Hinkler made the first solo flight, also in an Avian, establishing a new record of 15½ days from London to Darwin.

Between May 31 and June 10, 1928, Capt. Chas. Kingsford-Smith with C. T. P. Ulm, Lieut. H. Lyons, and J. Warner made the first flight from America to Australia in a Fokker F.VII, flying from Oakland, Calif., via the Hawaiian and Fiji Is. to Brisbane. Six years later Kingsford-Smith with Capt. Taylor made the first flight in the reverse direction in a Lockheed Altair, leaving Brisbane Oct. 22 and arriving Oakland on Nov. 4. Kingsford-Smith was knighted, 1932.

In May, 1930, Amy Johnson, flying a D.H. Moth, made the first solo flight by a woman, reaching Australia from England in 19½ days (created C.B.E.). In Oct. of the same year Kingsford-Smith, flying an Avian, reduced the time for the flight to 9 days, 21 hrs. 40 min. In April, 1931, C. W. A. Scott, in a Moth, reduced this time by 17 hrs. 29 min., and six months later C. A. Butler, in a Comper Swift, brought the time

down to 9 days, 2 hrs. Next year Scott made the journey in 193 minutes under 9 days. In 1933 Kingsford-Smith, flying solo in a Percival Gull, cut the time to 7 days, 4 hrs. 44 min., but 8 days later Ulm, with G. V. Allen, P. G. S. Taylor, and J. Edwards, made the passage in an Avro Ten in 6 days, 17 hrs. 45 min.



Australian Flights. Crew of the first flight: left to right, Sgt. W. H. Shiers, Lieut. Keith Smith, Capt. Ross Smith, and Sgt. J. M. Bennett. Above, Amy Johnson at Port Darwin after her historic solo flight in May, 1930

For the England-to-Melbourne MacRobertson air race de Havillands produced a remarkable new aircraft, the Comet, in one of which Scott and T. Campbell Black left Mildenhall, Suffolk, on Oct. 20, 1934, and reached Melbourne 71 hrs. 18 sec. later.

Following experience gained in two experimental air mail trips in 1931, regular air transport for passengers, mail, and freight between London and Australia began on Dec. 8, 1934, with Imperial Airways operating westward and Qantas Empire Airways eastward of Singapore. At first mainly a landplane service, this became a through seaplane route on June 26, 1938, using Short Empire flying boats. The time schedule was 9½ days between London and Sydney, with three services weekly; unsurcharged mail was carried from July 28, 1938.

During the Second Great War when the Mediterranean route was closed, the western terminus of the Australia air route was located at Durban, Natal, with a sea connexion thence to England. Air traffic passed via Palestine and Singapore on a route known as the horseshoe route. Japanese occupation of Malaya, the Nicobar Is., and Indonesia cut the route completely until Catalina flying boats and Liberator and Lancasterian landplanes spanned the 3,563 m. between Ceylon and Australia non-stop.

In the summer of 1945 the B.O.A.C.-Qantas air service between England and Australia was the fastest long-distance air route, with a twice-weekly service in each direction in 63 hrs., stopping at Lydda, Karachi, and Ceylon.

Re-opening of the Singapore-Darwin route was found possible in 1946.

In Aug., 1946, the famous Lancaster Aries, with an R.A.F. crew captained by Sqdn. Ldr. J. E. Aldridge, broke all records to Australia and on to New Zealand. The time from Blackbushe (Eng.) to Darwin (Austr.) was 46½ hrs.

Air transport services between the U.S.A. and Australia were long delayed through failure to agree on reciprocal rights for the combine formed from the British, Australian, and N.Z. governments' chosen instruments. But by 1946 U.S. and Australian lines had begun a joint regular service between San Francisco and Sydney. For later information see N.V.

Australian Wines. Wines produced from European plants, but naturally influenced by local soils and climate. The soil being largely virgin and often ferruginous, and the climate dry and warm, the wines are usually harder and stronger than their European prototypes. The growers have given them distinctive titles, such as Tintara, Kangaroo, Emu, etc. As lighter varieties cannot stand the lengthy sea-voyage to Europe, only the heavier, stronger varieties as a rule reach England.

Austrasia. Name given in the 7th century to a kingdom of the Franks, including much of the E. part of modern France, and also a certain part of modern Germany. Metz was its capital. For over a hundred years the country had its own line of petty sovereigns. In the 8th century it was united with Neustria to form the larger kingdom of the Franks.

AUSTRIA: HISTORY OF THE REPUBLIC

Robert Spira, LL.D. (Vienna), B.A. (London)

The writer deals with the political significance of this European state from its first creation as a duchy to its re-emergence as an independent republic after the Second Great War. See also Vienna and other Austrian towns, and under Austria-Hungary; Germany; Russo-German Campaign, etc. For later information see N.V.

Though Austria has been a recognizable entity in Europe since the 12th century, the Austrian republic is a 20th century state, formed out of the fragments of the Austro-Hungarian empire. Its frontiers were provisionally defined in the treaty of St. Germain, Sept. 10, 1919. It includes the provs. of Salzburg, Upper and Lower Austria, Vorarlberg, Burgenland, Tirol, Carinthia, and Styria. Some districts amputated from the three last-named provs. went partly to Italy and partly to Yugoslavia.

The boundary between Austria and Switzerland remained unchanged; to Italy was given part of Tirol (south of the Brenner) and the Sextenthal and the parts south of it: a small part of Southern Carinthia was given to Yugoslavia as well as Styria south of the Drave with the territory near Maribor. In the E., Austria gained at the expense of Hungary the greater part of the prov. of Burgenland: the new frontier runs from a point N. of Radkersburg to the S. of the Neusiedler See, and thence to the Danube just W. of Bratislava.

POPULATION AND INDUSTRIES. Austria consists of two parts, one lying astride the Middle Danube and a second one, the Alpine

region which is traversed by mt. ranges. It is watered by tributaries of the Danube, Inn, Enns, Muerz, Mur, and Drave.

It includes approximately 32,000 sq. m. with a population of about 6,500,000. Nearly all speak German as their mother-tongue. Before the Anschluss of 1938, 94 p.c. were Roman Catholics, 3 p.c. Protestants, and 3 p.c. Jews (the last-named were nearly exterminated by Hitler).

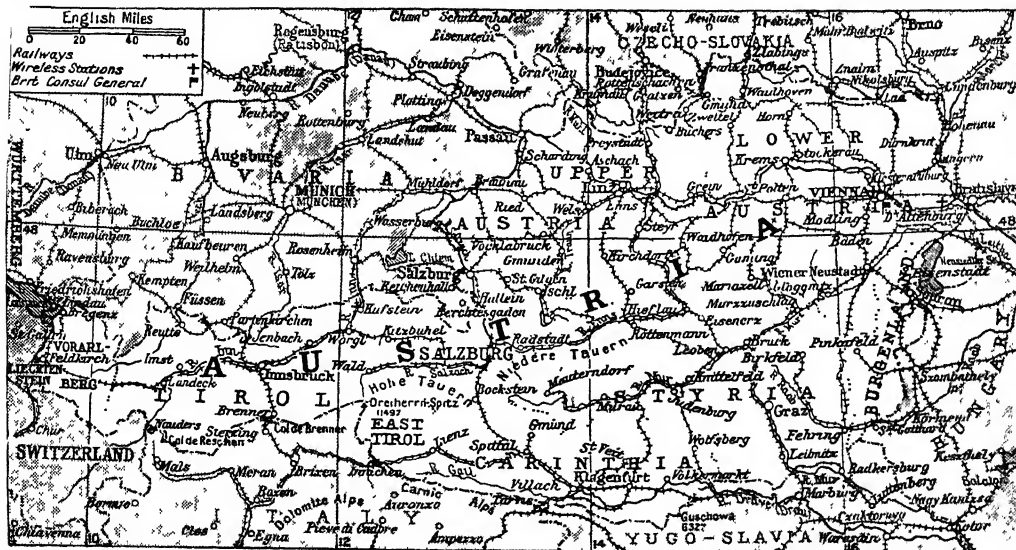
The chief towns and their populations as estimated in 1945 are Vienna, 1,418,900; Graz, 152,841; Linz, 108,970; Salzburg, 63,231. Innsbruck, 61,005. The percentage of arable land is generally low and grain and meat are imported. The forests are extensive and produce large quantities of timber. The chief minerals are iron, lead, zinc, and magnesite. Coal is only to be found in small quantity and poor quality. The oil production is now considerable. Lower Austria, especially Vienna, is the centre of manufacturing industries. Austria is now quite cut off from the sea.

HISTORY BEFORE THE HAPSBURG. When Augustus brought these provs. under Roman rule they were inhabited by Celtic tribes. Under the successors of Augustus, Vienna, then known as Vindobona

became an important frontier post of the Pannonian prov. Pillaged by the Huns of Attila, Vindobona disappeared in the 6th century, when the plain of the Middle Danube was overrun by the Avars. Meanwhile the South Slavs had made their appearance between the Danube and the Adriatic in the 8th century, and occupied Styria, Carinthia, and E. Tirol.

In 791 Charlemagne created the Ostmark in the land between the Enns and the Wiener Wald. It was given in 973 by Otto the Great to a Franconian family, the Babenbergs. This dynasty extended its territory E. to the rivers March and Leitha, and N. to the fringes of the Bohemian and Moravian mts.; on the S. it acquired Styria in 1192. The Ostmark was made a duchy by Frederick Barbarossa in 1156; from that time it was known as Austria (the vernacular Ostarreich). Vienna, which had been resettled as early as 1030, became the residence of the first duke.

After the extinction of the Babenbergs in 1246 their lands were annexed by Ottokar II of Bohemia, with Carinthia and Carniola. But this union between the Czechs and the South Slavs was soon destroyed. Rudolf I, the first Hapsburg to obtain the German empire, defeated Ottokar and bestowed Austria, Carniola, and Styria upon his sons. From 1282 to 1918 the Hapsburgs ruled continuously in Vienna. The remaining provs. of German Austria fell into their hands at various



Austria. Map showing the boundaries of the Republic as defined by the Peace Treaty of 1919, including the south portion which, after a plebiscite of the inhabitants, remained Austrian territory

dates: Carinthia in 1335 and Tirol in 1363. This area of about 50,000 sq. m. was the inheritance passed by Charles V in 1556 to his brother Ferdinand. In 1779 Joseph II extorted from the Wittelsbachs of Bavaria the district of the Innviertel. Salzburg was given by Napoleon to the emperor Francis II in 1805.

The Hapsburgs, rulers of Austria, were at the same time (1273-1804) nearly uninterruptedly the emperors of the Holy Roman Empire of the German nation; for this reason the history of Austria is interwoven with that of Germany. Francis II, however, discarded in 1804 the title of a German emperor and proclaimed himself emperor of Austria. By this resignation the fact was acknowledged that the Hapsburgs' (and Austria's) influence on the German states was on the decline. During the years 1804-1866 the Austrian emperors tried in vain to keep part of this influence in different ways. This issue—the struggle for the supremacy in Germany between Austria and Prussia—was brought to a decision by war. Austria was defeated by Prussia in 1866 and lost her voice in German affairs.

The Austrian emperor Francis Joseph (1848-1916) had to confine himself to the task of uniting 12 different nations in Central Europe. To this end he created in 1867 the Dual Monarchy of Austria-Hungary which was to last until the end of the First Great War in 1918. Austria, which in 1914 had a population of more than 30 millions consisting of 9 nations, apart from Hungary, was in most respects self-sufficient. (See Austria-Hungary.)

Constitution of 1867

Austria herself received in 1867 a new constitution and parliament. But the regime remained at least partly autocratic and the hegemony of the German aristocratic, military, and bureaucratic ruling class over the other eight nationalities was left untouched. The resistance of these nations against this hegemony grew in strength from year to year. Some attempts were made to find a compromise between the different nations but failed chiefly because the parliament was not the true expression of the will of the people, who were mostly disfranchised. Universal suffrage was not granted before 1907, and then it was apparently too late to solve the national problems in a democratic way. The empire broke up into several states as an immediate consequence of defeat in war.

THE REPUBLIC UNTIL THE TREATY OF GENEVA. The last emperor Charles I tried towards the end of the war to give the nations autonomy on a federal basis. But the Polish, Czechoslovakian, and Yugoslavian provs. were already about to establish their independent status. On Oct. 21, 1918, the German members of the Austrian parliament constituted themselves a provisional national assembly declaring the right of self-determination for the German-speaking provs. of Austria. On Oct. 30 they selected a council of state consisting of Social-Democrats, Christian-Socialists, and Pan-Germans which elected the government with the Socialist leaders Karl Renner as chancellor and Victor Adler as foreign minister (Adler died shortly afterwards and was succeeded by Otto Bauer). The provisional assembly declared for the establishment of a republic and for union (later renounced) with Germany. On Nov. 11 Charles renounced all participation in the business of state, left Vienna, and went to Eckartsau, an old castle which he left in March, 1919, for Switzerland.

On Nov. 12 the republic of Austria was proclaimed. On Feb. 16, 1919, elections for a constituent assembly took place on a proportional basis. The Social-Democrats received 69 seats, the Christian-Socialists 63, and the Pan-Germans 24. A coalition ministry was formed with Renner as chancellor. In June, 1919, Renner left for the peace conference at St. Germain. The treaty reduced the territory of Austria to one-eighth that of the former Dual Monarchy. Austria was declared an independent state, which meant renunciation of the Anschluss with Germany. In Sept., 1919, the assembly authorised Renner to sign the treaty of St. Germain. Next year the Socialists cancelled the coalition and asked for a new election. A new constitution was accepted in Oct., 1920, conveying the main power in directing the affairs of the state to the national assembly. The second chamber, the federal council, was more or less meaningless. The state was to be a democratic federation, consisting of the 8 provs., to which was to be added the capital Vienna, each with a separate legislative right which, however, was under a certain control of the central power. The rights of the federal president were very limited.

The national assembly was elected in Oct., 1920. The Christian-

Socialists became the strongest party (without obtaining the majority) and received 82 seats, the Socialists only 66, and the Pan-Germans 26. Hainisch, a non-party economist, was elected first president of the republic. After a short-lived ministry (under the Christian-Socialist Mayr) the police president of Vienna, Schober, formed, in June, 1921, a cabinet chiefly of non-party members. He resigned in May, 1922, and the Christian-Socialist prelate Seipel formed a Christian-Socialist government with the support of the Pan-Germans. As economic conditions became unbearable owing to the irresistible decline of the Austrian currency, he succeeded in obtaining a loan from the League of Nations of £30,000,000 to stabilise the Austrian currency. Great Britain, France, Italy, and Czechoslovakia guaranteed this sum in the protocol of Geneva (Oct., 1922) and Austria was placed under strict financial supervision. These continual governmental changes reflect the unstable political and economic conditions in the post-war period.

Economic Depression

The Austrian republic was a disabled organism. The economic, industrial, and administrative apparatus of Austria and especially of Vienna was planned for the needs of fifty million people and so Vienna became a head without a body. Austria was severed from her former markets and sources of raw material. All national states erected economic barriers against her to make themselves economically self-sufficient. The Allies did not give up the economic blockade. Even the provs. of the new republic separated themselves economically from the socialist capital. The food situation in Vienna became hopeless: industrial production almost came to a standstill through lack of raw material and coal. The home coal production was only one-half p.c. of the requirement. Only through the help of the Allies could the country be fed. Added to this was political unrest, the struggle between Socialists and Communists, which the Socialists finally won. The Socialist leader Deutsch founded a people's bodyguard which became afterwards the bulk of the federal army.

But owing to the help of the Allies and the general economic prosperity in Europe after the war, these adverse conditions were to be overcome in less than two years. Whereas in May, 1919, the

number of unemployed was 185,000, it fell in the autumn of 1920 to 15,000. The economic reconstruction and the political situation enabled the government to carry out a number of social reforms such as the establishment of the 8-hour working day, of works councils, chambers of labour, unemployment insurance, etc. These figures show the upward movement of exports:

	2nd half of 1919	1920	1921
	Centners (hundredweights)		
Paper goods	310,680	957,056	1,144,300
Machines	125,441	411,642	538,015
Imports rose in similar proportions to exports.			

But the world prosperity was followed by a crisis which affected Austria as well. The increasing devaluation of the Austrian currency produced a heavy adverse trade budget which could only be overcome by increasing the number of banknotes issued, so that devaluation was aggravated from month to month and even from day to day. This is shown in the rise of the Swiss franc compared with the Austrian crown. The Swiss franc, having risen at the end of 1919 to 33 crowns, reached on June 1, 1922, 2,150 crowns; on July 14, 5,248 crowns; on August 25, 15,993 crowns. Then the devaluation of the crown stopped owing to the loan given by the Geneva agreement. But the consequences were already disastrous. Most fortunes were destroyed. This made the bourgeoisie hostile to the workers, who were comparatively better off; hence the political rallying of the middle class round the Christian-Socialists, who grew in number and political power.

Democracy and Fascism

Seipel remained in power from 1922 to 1929 (with a two-years' interruption). In March, 1925, the now stabilised Austrian currency was based on the Austrian schilling (about two-thirds of the British shilling). This period saw a certain economic prosperity in accordance with the general European development. But the political divergence between the Socialists and their opponents increased. Both built up their already existing armed guards: the bourgeoisie the Heimwehr, and the Socialists the Republikanischen Schutzbund. Both armed forces held their parades near one another, which led to skirmishes, with dead and wounded. In 1927 on such an occasion two Socialists were wounded and a boy killed, but the accused were acquitted by a jury

in Vienna. The workers in Vienna became embittered; there were riots throughout the city on July 15, 1927. The Socialist leaders proved powerless and the main law court in Vienna was set ablaze; 84 were killed and many wounded by the police. A general strike was put down with the help of the Heimwehr, which from then onwards increased extraordinarily in power. The tension grew between government and Socialists, and Seipel resigned in April, 1929. After a short interval Schober formed a chiefly non-party government and tried to bring about a disarming of Heimwehr and Schutzbund. Prince Starhemberg was made chief of the Heimwehr, threatened a *coup d'état*, and refused disarmament. Schober had to give way in Sept., 1930, to the Christian-Socialist Vaugoin, who formed a government with two members of the Heimwehr (now a political party as well).

In Nov., 1930, the last elections of the republic took place. The Socialists now received 72 seats, the Christian-Socialists 66, the Heimwehr 8, and the Pan-Germans (headed by Schober) 19. Vaugoin was replaced by the Christian-Socialist Ender, who appointed Schober as foreign minister.

Customs Union with Germany

By 1929 an economic crisis confronted all Europe, including Austria, where by 1934 the number of unemployed had risen to 400,000. Austria looking round for help, Schober concluded in March, 1931, a customs union with Germany. The Allies were opposed to this as being a first step to the forbidden Anschluss. In May, 1931, the Credit-Anstalt, the biggest bank in Austria, collapsed. Vaugoin was replaced by the Christian-Socialist Buresch, who renounced the customs union. Internal tension grew. The head of the Styrian Heimwehr, Pfiemer, tried a "putsch" to seize power; but after being a "half a day dictator of Austria," he failed.

In May, 1932, the Christian-Socialist Engelbert Dollfuss formed a cabinet consisting of Christian-Socialists and Heimwehr members. The Pan-Germans refusing support, the government had a majority of one vote only. With the increasing power of the Nazis in Germany, the Nazi party in Austria grew in numbers and still more in noisy propaganda. They opposed Dollfuss and asked for new elections. Dollfuss with his precarious majority in parliament declined this, knowing that it

would mean the end of his power. He declined as well to conclude a coalition with the Socialists which would have ended the deadlock and saved the democratic parliamentary system. He preferred instead the fight on two fronts, against Nazis and Socialists. This was only possible by abandoning the democratic parliamentary system altogether and choosing a fascist regime. This was in line with his foreign policy. Declining any other combination, he chose to lean externally towards Italy. Mussolini himself, whom Dollfuss frequently met, supported his anti-democratic internal policy.

The Patriotic Front

In June, 1933, Dollfuss banned the Austrian Nazi party and in Sept. founded the Patriotic Front which was to replace all political parties. He outlined his intention to abandon all democratic institutions and curtailed the rights of free press, free assembly, and many rights of the workers. He made use of an old overlooked war emergency law which enabled him to rule without consulting parliament. When the workers' opposition to this dictatorial regime grew, the Heimwehr took the offensive and tried to storm the Socialist strongholds to capture their arms and to seize power in all local governments where there was a Socialist majority. The Socialists resisted this attack by force of arms.

On Feb. 12, 1934, the revolt spread to Vienna, and a general strike was proclaimed but succeeded only partially. The police, the army, and the Heimwehr were mobilised against the revolting workers. Their quarters, especially the enormous newly built council flats, were besieged and shelled with heavy artillery guns. The government forces were well equipped, the workers only poorly armed. The unequal fight lasted four days. Casualties were stated as follows: on the side of the government 128 dead, 409 wounded; civilians 193 dead, 300 wounded.

The leaders of the revolution, Deutsch and Bauer, fled abroad; the remaining Socialist chiefs were arrested, many received heavy penalties, some were sentenced to death. The party and all their organizations and trade unions were dissolved and their property confiscated. In April a new constitution was proclaimed by Dollfuss. The freely elected parliament was replaced by representation of professional corporations.

Though the workers were silenced, the Nazis were not, because they had the support of an external power Nazi Germany. After local outbursts, on July 25, 1934, a small Nazi armed force seized the inadequately guarded chancellery where Dollfuss and his Heimwehr minister Fey stayed. Dollfuss was assassinated by the Nazi Planetta. The Nazis tried to make the Christian-Socialist Rintelen (who was secretly Nazi) chancellor, but the putsch was put under control. Planetta was sentenced to death; Rintelen received a life sentence.



Austria. On March 13, 1938, following an ultimatum by Hitler two days earlier, German troops entered Austria. Here they are seen at Innsbruck, being greeted with the Nazi salute by an enthusiastic crowd.

LAST YEARS OF THE REPUBLIC. Kurt von Schuschnigg took over the chancellorship and followed the Dollfuss policy of eliminating the parliamentary system. Relations between Austria and Germany remained very strained, though von Papen was appointed ambassador in Vienna. The latter brought about an Austrian-German agreement (July, 1936) to settle differences in a friendly way, and Hitler recognized the full sovereignty of Austria. But the Nazi activities did not stop and became even more violent. Papen persuaded Schuschnigg to meet Hitler at Berchtesgaden. On Feb. 12, 1938, the former was presented with an ultimatum asking him (among other demands) to take prominent Nazi leaders into his cabinet, otherwise Austria would be invaded. Schuschnigg gave in. Two important ministries were given to Nazi leaders (one of them Seyss-Inquart) and a free hand was given to all Nazi organizations. But soon Schuschnigg recognized that this meant Nazi-fication from within and the end of Austria's independence. He tried to turn the tide and ordered a plebiscite to be held on March 13 over the question of Austria's independence. But it was too late. On March 11 an ultimatum was given by Hitler; if the plebiscite were not called off, German troops would march in. The plebiscite was cancelled and Schuschnigg resigned, but in spite of all that he was arrested. Seyss-Inquart

took over the chancellorship. The German army marched in. Thus ended the first Austrian republic.

Under Hitler's regime (1938-1945) Austria remained only a German province called Ostmark. In the spring of 1945 Austria was liberated by the Allies. The Russians occupied Vienna on April 13; the other provinces were liberated by British, American, and Russian troops. On April 29 a provisional coalition government was formed consisting of Socialists, Communists, and a people's party headed by the veteran Renner, which was recognized by the Allies on Oct. 21. This party, led by Dr. Figl, won elections in Nov., and Renner became president. In June, 1945, Austria was divided into four zones, under British, U.S., Russian, and French control. For subsequent history see Austria in N.V.

CULTURAL ACHIEVEMENTS. The closing years of the empire saw the culmination of Austrian science and art. Vienna proved to be an excellent fostering soil for this culture, which represented a blending of aristocratic and middle class elements. These criteria proved so strong that they outlived the empire and spread on to the republican era. The famous schools of medicine, chemistry, and physics flourished. Some scientists won the Nobel prize. The modern psychological school (Sigmund Freud and Alfred Adler) attained world fame. In literature the truest expression of the Austrian

genius with its sense of musical harmony and poise was in the work of Hugo von Hofmannsthal, Arthur Schnitzler, Beer-Hoffmann, Stefan Zweig, and Karl Kraus, the satirist. In music the great Austrian tradition was taken up in a modern and abstract way by Schönberg, Alban Berg, and Wellesz. The production of operettas (Lehar, O. Strauss, etc.) went on. Festivals at Salzburg were created to show what Austria has accomplished in music and drama. In painting Klimt and Schiele were followed by Kokoschka, the great visionary artist. Otto Wagner, Hoffmann, and Loos became pioneers for a new architecture of social significance. In this connexion should be mentioned the housing policy of the socialist municipality of Vienna, which followed unorthodox lines. They provided the funds by taxing luxuries heavily, thus raising more than £8,000,000 with which monumental blocks of flats were built: the rents could be kept very low as only the cost of upkeep had to be covered.

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Austria-Hungary. Empire which existed from 1867 to 1918. It consisted of the empire of Austria, then including Bohemia, and the kingdom of Hungary with its dependent province of Croatia-Slavonia. It was therefore often called the Dual Monarchy.



Austria-Hungary
arms

In addition it included after 1908 the provinces of Bosnia and Herzegovina, annexed from Turkish suzerainty. In 1910 the area was 261,259 sq. m. and the pop. 51,356,465, with at least a dozen races represented.

By the Ausgleich or compromise of 1867, the two states remained independent of each other, having each a constitution with legislative and executive bodies. Connexion was by the crown (Francis Joseph of Austria being emperor until his death in 1916, and his nephew Charles succeeding), and by certain departments of state. Administered jointly were foreign affairs, military affairs, and financial matters associated with them. Ministers in charge of these departments were responsible to a delegation for each country, chosen by its legislature, elected for a year and meeting together alternately in Vienna and Budapest. The foreign minister acted as premier and chief medium between the emperor and delegations. The active army was under joint control, service being compulsory and including two years with the colours; in 1914 the peace strength was 400,000, organized into 15 army corps. There was further a commercial union, with a single system of customs, common weights and measures, joint state bank, state industrial monopolies, and one consular service.

Diplomatic Successes

The first chancellor was Beust, who was succeeded in 1871 by Andrassy. Feeling towards Prussia passed from hostility to friendship, good relations were established with Italy, and the foreign interests of Austria-Hungary gravitated towards the Balkans. A diplomatic success was gained at the congress of Berlin, 1878, after Russia's victory over Turkey, when the Dual Monarchy was granted administrative rights over Bosnia and Herzegovina although they remained nominally Turkish for 30 years. Treaties

with Germany, 1879, and Italy, 1882, brought about the famous Triple Alliance which determined European diplomacy up to the First Great War. In 1885 Austrian action ended the Bulgarian advance into Serbia, but thereafter there was some coolness towards Russia and often danger of war.

In 1897, Badeni being chancellor, serious agitation and racial difficulties in Hungary placed the Ausgleich itself in jeopardy; yet it was renewed in 1899 and 1907. Magyars and Czechs continued to seethe with discontent. From 1908, however, foreign affairs dominated all other considerations, the Dual Monarchy throwing in its lot with that of Germany, which it had been the only power to support at the conference of Algeiras. The chancellors Aehrenthal and Borchardt continued to strive for good understanding and peaceable relations with the western powers, but throughout the Balkan wars of 1912-13 the Dual Monarchy saw threats on the east from the ambition of Serbia to possess a coastline, and more remotely from Russian desires of expansion; and steps towards mobilisation were at once taken. In the chain of events leading to war in 1914 the Dual Monarchy must bear some responsibility for having assured itself that full German support would be forthcoming for any action, however high-handed, against Serbia, and it was the assassination of the Austrian archduke Francis Ferdinand by an Austrian subject of Serbian blood at Serajevo on June 28 which provided cause for an ultimatum.

The Austrians had the worst of heavy fighting against the Russians in Galicia; but they overran Serbia and gained successes in Poland, and their victory over the Italians at Caporetto in Oct., 1917, was a resounding one. But cumbersome governmental machinery, the perpetual racial troubles, and the stringency of the Allied blockade more than counterbalanced any gains in the field. Austria-Hungary was the first of the Central Powers to approach the Allies for peace and had to accept unconditional surrender on Nov. 3, 1918. Nine days later the emperor abdicated and the realm was in disruption.

Austrian Succession, WAR OF THE. European struggle waged between 1740 and 1748. Charles VI, by the Pragmatic Sanction of 1713, settled his hereditary possessions in Austria, Hungary, Bohemia, and Sicily upon his daughter,

Maria Theresa, queen of Hungary, and in 1731 Great Britain guaranteed that settlement. She did so in pursuance of her policy of resisting the ambitious enterprises of France and Spain. Strategical reasons, and in the case of Spain commercial considerations also, prompted her opposition to those Powers. The emperor died in 1740, and his death was the signal for an outbreak of intrigue against the queen, and of eight years of fighting by land and sea, much of which had but a remote relation to the Austrian succession.

Cession of Silesia

An obligation to support Maria Theresa rested upon Great Britain. Frederick of Prussia, afterwards called the Great, demanded from her the cession of Silesia, and Walpole counselled her to accede and thus bring Prussia to her side, but his advice was rejected. Prussia thereupon entered into sullen alliance with France, and became England's enemy. Walpole knew the importance of a strong confederation against Britain's rivals, and Carteret, his successor, pursued his policy of bringing Austria and Prussia together. Maria Theresa ceded Silesia to Frederick by the treaty of Breslau, 1742. France claimed the Netherlands and would have broken up Austria into a group of countries too weak to resist aggression. Spain aimed at the possession of the Milanese, and Bavaria claimed the Austrian duchies. By the Family Compact of 1733 Louis XIV and the Spanish king had undertaken to secure from Britain the return of Gibraltar to Spain, and the transfer to France of the commercial privileges which England enjoyed in the trade of Spanish America. English merchants were seeking to exceed the trading limits fixed by the treaty of Utrecht, and feeling became so strained, mainly by the incident of "Jenkins's Ear" (see Jenkins, Robert) and other tales of barbarities, that war with Spain was declared in 1739, and an English fleet blockaded Cadiz.

Far more important to England was the strategic route through the Mediterranean. In the War of the Spanish Succession it had been her purpose to secure means of maintaining a fleet permanently in that sea, and with that object to possess Minorca. Now the grouping of the Powers was different, but the purpose was the same, and both Minorca and Gibraltar were menaced. Spain was seeking to aggrandise her position in Italy,

and France turned her eyes to Egypt as the key of the short route to the East, where Dupleix was building for France an empire in southern India.

War was not actually declared between France and England until 1744, but the declaration was a formality. The ships of the two Powers had been fighting already, and English troops had taken part as allies of Maria Theresa at Dettingen, June 27, 1743, where King George and the earl of Stair, endeavouring to drive the French out of Germany and to enter Alsace and Lorraine, had a happy escape from the strategic grasp of the duc de Noailles and the duc de Grammont. But Maria Theresa won the enthusiastic support of Hungary by her internal policy, marched with an army to the rescue of Vienna, and drove back Frederick in Moravia.

In the Mediterranean the naval operations against Spain had been ineffective, but by a threat to bombard Naples the Bourbon king of the Two Sicilies was compelled to withdraw the troops he had sent against Maria Theresa. She thereupon dispatched an army to Naples with the object of seizing it and transferring it to the Bavarian emperor, whose hereditary dominions were to be ceded to her in return.

Victories of Anson and Hawke

The French came into the naval war in 1743, and in Feb., 1744, off Hyères, took place the action of Admiral Mathews against a combined French and Spanish squadron, in which that dull and clumsy officer made an ineffective attack, while Lestock, his second in command, held aloof. Only the action of Captain Cornwall in the Marlborough, and Captain Edward Hawke (afterwards the famous admiral) in the Berwick saved the engagement from being a complete reproach to the British naval service. But regeneration of the navy was in progress under Anson, and on May 3, 1747, he inflicted a severe defeat off Finisterre upon La Jonquière, who was about to carry help to the French settlements in America, where Louisburg had been captured. On Oct. 14, 1748, Hawke, off Belle Isle, defeated L'Etenduère.

But it was rather the weakness and unreadiness of the French and Spaniards than her own strength, readiness, and vigour that saved England from disaster. The campaigns included attempts of the French to invade England in support of the Jacobites, the

defeat of English, Hanoverian, and Dutch forces at Fontenoy, May 11, 1745, French conquests in the Netherlands, Austrian successes in Italy, and much fighting in India, where the French captured Madras in 1746. The Pelhams, alarmed by defeat abroad and a rebellion at home, made peace with Prussia by the convention of Hanover, and the war ended with the peace of Aix-la-Chapelle, Oct. 18, 1748, by which the French gained nothing material, while England surrendered her conquests at sea. Spain obtained the duchies of Parma and Piacenza, and Prussia gained possession of Silesia. But the international difficulties still remained, and the peace was merely a truce. Austria was not content, Spain was still inimical, and France still had her ambitions in two hemispheres. The Seven Years' War, 1756-63, was the result.

Austriac. Generic term denoting two related families of agglutinative languages. Widespread over S.E. Asia and Oceania, they extend from Madagascar to Easter Island, from the Punjab to New Zealand. W. Schmidt introduced the term to mark the organic relationship of the Austroasiatic—preferably Austroasian—and the Austronesian language families. Austroasian embraces the Munda and Mon-Khmer sub-families, spoken in India and Indo-China. Austronesian, formerly called Malayo-Polynesian and Oceanic, embraces the Indo-

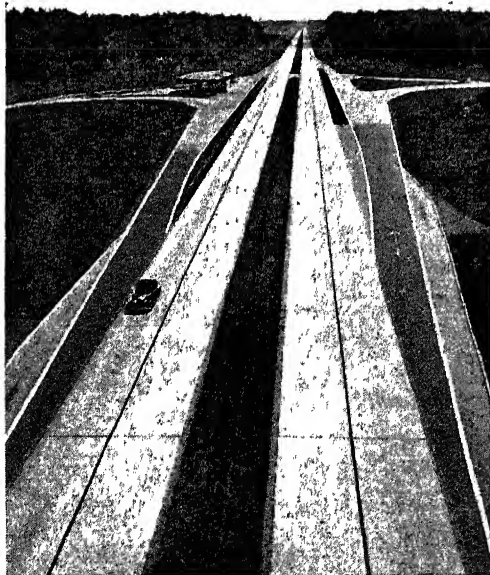
nesian, Melanesian, and Polynesian sub-families. As with Aryan, community of speech implies no identity of racial origin. See Language; Philology.

Autarky (Gr. *autos*, self; *arkein*, to suffice). Self-sufficiency of a country or empire. Distinguished from autarchy (*autos*; *archein*, to rule), the term was much used during the economic depression of the 1930s, when each country was striving to protect its own markets and secure exclusive sources of vital raw materials.

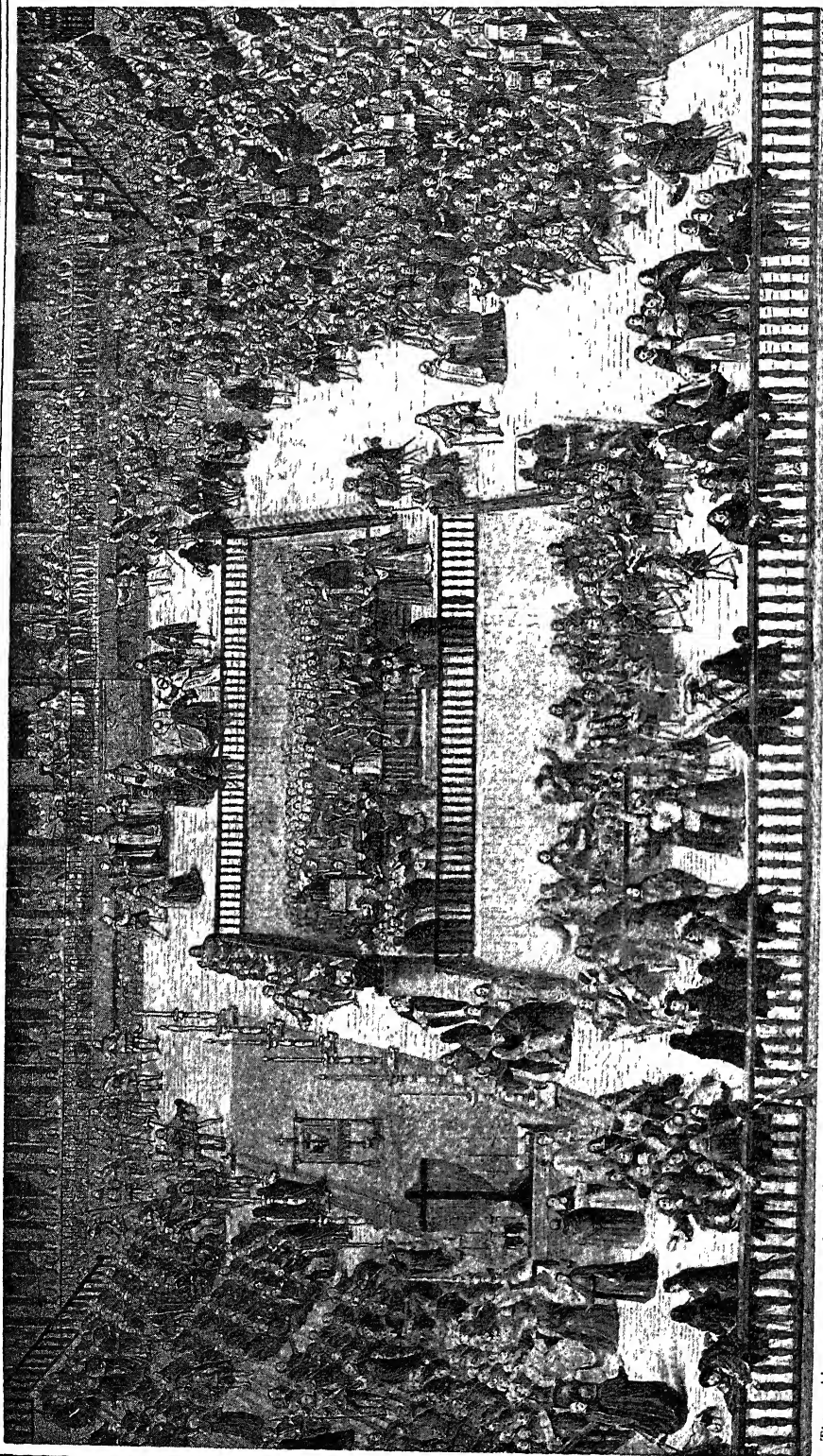
Auteuil. Suburb and residential district of Paris. S.W. of the city, between the Seine and the Bois de Boulogne, it is connected with Paris by rly., and can be reached by river. It is famous for its racecourse and railway viaduct. Boileau and Molière lived here.

Auto (Spanish, act). A form of morality play which flourished in Spain and Portugal, being especially represented at the festival of Corpus Christi. The characters were personifications of virtues and vices and other allegorical figures, and the religious nature of the pieces was emphasised by the full name, Autos Sacramentales (Sacramental Acts). Lope de Vega wrote about 400 autos and Calderon nearly 100. The performances were forbidden in Spain in 1765. See Morality Play.

Autobahn. German state motor road. In 1933 the construction was inaugurated by Hitler of a network of high-speed motorways linking the principal German cities. It had three professed objects: relief of unemployment, encouragement of the German motor industry, and promotion of international tourist traffic. Railway crossings were eliminated, bicyclists and pedestrians were forbidden to the Autobahnen, and about 120,000 men were kept permanently at work. The completion of the scheme was disrupted by the Second Great War. The plan was based on six principal roads—two running N.-S.,



Autobahn. Section of a high-speed motor road near Darmstadt, Germany, showing arrangement of junction



This public ceremony was in medieval times and as late as the early eighteenth century a common sight in Spain. Criminals and heretics were tried by a religious court of inquisitors at which the King and Queen, either in person or in effigy were present, as well as the great nobles and their ladies and officers of state. The victims were dressed in quaint garbs with high hats like the old fool's cap, and effigies of others whom the inquisitors could not capture or who were already dead were also brought for trial. In the centre of the picture a victim stands in the dock while a priest in the witness-box alongside gives evidence of the accused's heresy. In the foreground other prisoners are being brought forward by priests who hold crosses before the eyes of the heretics, and on the left a penitent kneels before an altar. On the right are many others alive and in effigy awaiting trial, surrounded by their guards. Death at the stake was the common doom, the effigies also were burned, as well as the bones of persons who had died outside the pale of the church.

AUTO-DA-FE CELEBRATED IN THE PLAZA MAYOR, MADRID, JUNE 30, 1680 : AFTER THE PAINTING BY FRANCISCO RIZI (1608-85). PRADO MUSEUM, MADRID

and four E.-W. The E.-W. roads were: (a) Hamburg-Stettin, with a complementary section in E. Prussia, Danzig-Konigsberg; (b) Cologne - Hanover - Berlin; (c) Cologne - Dresden - Breslau; (d) Karlsruhe - Stuttgart - Munich. These highways were linked with other districts by smaller trunk roads, a total mileage of 4,500 having been planned. The first section (Frankfort - Darmstadt) was opened in May, 1935. The entire network was put under the direction of Fritz Todt (*q.v.*). The standard road was 78 ft. wide and divided into two one-way carriage-ways, each 25 ft. wide, with a central island strip.

Autobiography (Gr. *autos*, self; *bios*, life; *graphein*, to write). Account of any man's life written by himself. The term is less accurately used of books in which some portions of the writer's own experiences are given in the general narrative. Letters and diaries, though providing much autobiographical material, can be classified as autobiographies only with a qualification that applies to many of the memoirs or reminiscences in which the individuality of the writer is subordinated to the events or people of whom he writes. Some autobiographies are concerned more with the writer's spiritual than with his material life, as the Confessions of S. Augustine and the Apologia Pro Vita Sua of Cardinal Newman. Others are mainly presentations of that part of the writer's life connected with some outstanding event or significant period of his career, such as Silvio Pellico's account of his life in prison.

Notable autobiographies are those of Cellini, Gibbon, Casanova, Chateaubriand, Cobbett, De Quincey, Leigh Hunt, J. S. Mill, and Trollope. Modern autobiographies include, among literary names, those of W. H. Davies (the "Super-tramp"), H. G. Wells, G. K. Chesterton, and Rudyard Kipling, and people famous in other spheres have written their life-stories, *e.g.* Sir Henry Wood, Isadora Duncan, Axel Munthe (The Story of San Michele), Ely Culbertson, the Countess of Oxford and Asquith.

Novelists often make use of their own autobiographical materials in their stories, *e.g.* Charles Dickens in David Copperfield and George Borrow in Lavengro and the Romany Rye. See Biography.

Autochthones (Gr. *autos*, self; *chthōn*, earth). Term used by some Greek peoples, especially those of

Athens, Argolis, and Arcadia, to suggest that their first ancestors were sons of the soil, and not immigrants from another land. The word aborigines has acquired a relative meaning, connoting peoples, themselves admittedly immigrants, *e.g.* the Tasmanians, found in a distant land by its European discoverers.

Autoclave (Gr. *autos*, self; Lat. *clavis*, key). Steam-tight cooking vessel or apparatus wherein substances may be heated under pressure. It consists of a strong metal body, with a removable airtight cover, generally provided with a safety valve to prevent the danger of explosion through the internal pressure generated being higher than the resisting powers of the walls of the vessel. The autoclave is an important item of laboratory equipment, and a wide variety of models is available.

Autocracy (Greek *autos*, self; *kratein*, to rule). Term used for a form of government in which the ruler acts on his own authority without responsibility to any other person. See Dictator.

Autocrat of the Breakfast Table, THE. Discursive essays interspersed with poetry, by Oliver Wendell Holmes (*q.v.*), published, after serial appearance in The Atlantic Monthly, in 1858. Touching upon all subjects with shrewd insight, lambent wit, and poetic fancy, The Autocrat ranks among the finest of its author's writings.

Auto-da-fé (Port., act of faith). Name of a public ceremony associated with the Spanish Inquisition. It followed the passing of sentence on heretics and others, and took the form of a procession and a service. The chief figures were the familiars of the Inquisition, the condemned persons, and those who had recanted. The

service usually included the celebration of the Mass, the taking of an oath of obedience to the Inquisition, a sermon, and the reading of the sentences pronounced by the inquisitors.

The term auto-da-fé is also applied to the carrying out of the sentence of the Inquisition, and more especially so when that sentence was the public burning of the heretic or heretics who had been so sentenced. It is thus used by Voltaire in the sixth chapter of Candide, which tells how on June 20, 1756, "the Portuguese made a beautiful auto-da-fé to prevent any further earthquakes." The first auto-da-fé took place in Spain in 1481, the last in 1813. Autos-da-fé were most frequent and impressive in the 15th century, after the 16th they became less so, partly because they were held in secret. They were also held in Spanish America, and one is recorded in Mexico in 1815. See Inquisition.

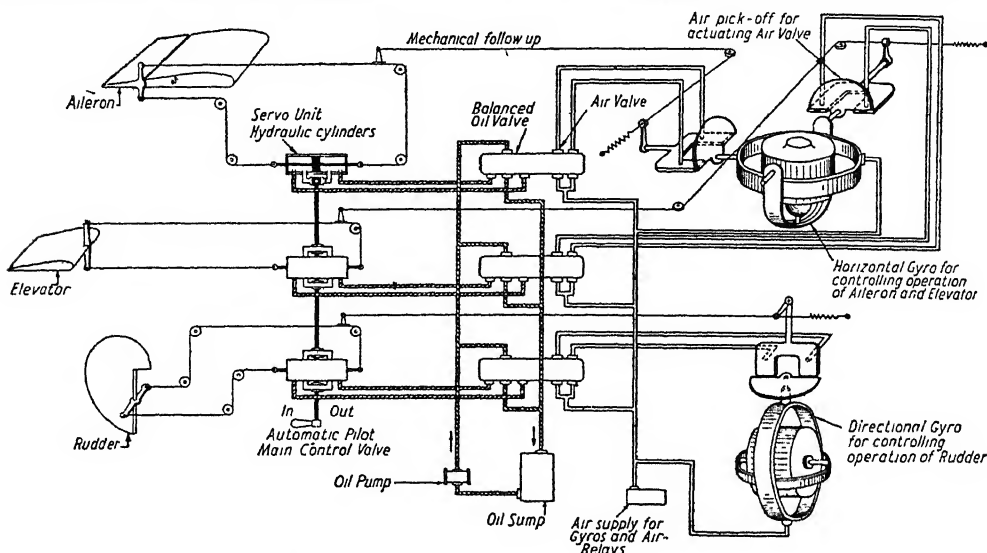
Autogiro. Type of aircraft with revolving rotor, designed to become airborne without the necessity of an initial run or take-off along the ground. Since Leonardo da Vinci (1452-1519) described his plans for "a hovering aerial carriage," inventors have experimented with various types of vertical-lift flying machines. The first gyroplane was invented in 1920 by the Spaniard Juan de la Cierva (*q.v.*). As developed, it has a large rotor, with two, three, or four articulated blades, mounted on a column above the cockpit and replacing the fixed wing of the orthodox aeroplane. When in flight the rotor is not, as in a helicopter (*q.v.*), driven by the engine, but is revolved by forward movement. There is also an engine-driven airscrew in the nose of the fuselage. The Autogiro is not

ruddered in the ordinary sense, and it is without the foot rudder-bar of the ordinary aeroplane. The pylon supporting the rotor can be slightly tilted in any direction so that the rotor may rotate on an inclined axis; by varying the inclination of the rotor's axis, the direction of flight is changed.

One of the principal difficul-



Autogiro. Cierva's first experimental machine appeared in 1920; above is the C40, a model of 1939
Photo, "Flight"



Automatic Pilot. Sectional drawing of the Sperry automatic pilot, showing how the gyros work the rudder, elevators, and ailerons. This remarkable but reliable mechanism proved its value particularly in record-breaking long-distance flights

ties in designing an Autogiro that would be stable in flight or during its lift from the ground was that the blades of a horizontally rotating rotor move faster through the air on that side in which they are moving in the direction of travel than on the opposite side. Thus they have a greater lift on one side than on the other, and unless corrected would give lop-sided lift. An Autogiro can remain airborne and in horizontal flight at any height even when travelling forward at less than 10 m.p.h. Hence it was adopted for military purposes as an army cooperation aircraft and proved particularly valuable as an artillery spotter. Autogiros have also been extensively used by police in the control of land traffic: by hovering over a congested area they give the pilot a bird's-eye view and enable him to transmit radio instructions to the ground. See Helicopter.

Autograph (Greek *autos*, self; *graphein*, to write). General term for a document or signature in the author's own handwriting. Strictly, a document written throughout in one person's handwriting is a holograph (Gr. *holos*, whole). The Greeks and Romans, and also the Chinese, were eager collectors of autographs. In Germany in the 14th century autographs began to be collected in little books known as *alba amicorum*, albums of friends—the forerunners of the modern visitors' book—and such collections became popular in Europe generally in the 16th century. A large num-

ber of facsimiles of the autograph signatures of celebrated persons appear under their portraits in this work. In Great Britain the finest public collection is in the British Museum. in the U.S.A. the Emmet collection in the New York Public Library. Of private British collections the catalogue, printed for private circulation 1883-92, of that formed by Alfred Morrison, 1865-82, runs into six volumes large 4to.

Autolycus. In Greek mythology, a famous thief, son of the god Hermes. Detection of his robberies was difficult, as he had the faculty of transforming the articles he stole. He was overreached at last by Sisyphus (q.v.). In Shakespeare's *The Winter's Tale*, Autolycus is a pedlar, "a snapper-up of unconsidered trifles."

Automatic Machines. In popular usage in Great Britain, this term is limited to various types of automatic vending machines, weighing machines, and machines which provide automatic games on the insertion of a coin, which releases a catch or spring.

Automatic machines which offer some reward to a player if he pays money and can manipulate the machine in a particular way may result in an offence against the Betting Act, 1853 (see Betting), if played solely for the purposes of gain and not with the object of enjoying a game of skill. If no skill is involved in manipulation an offence against the Gaming Houses Acts, 1845 and 1854, may also be committed. See Gaming.

Automatic Pilot. Instrument enabling an aircraft to fly on an even keel and in a set direction without the agency of a human pilot. The automatic pilot is based upon the principle of the gyroscope (q.v.): when a symmetrical body is set revolving about an axis, the latter tends to maintain its position in space unless some external force is applied. A gyroscope installed in an aircraft with its spinning axis along the keel, or fore-and-aft line, of the fuselage will, by virtue of its inertia, keep its axis in a constant position relative to the earth.

An aircraft flying freely in air can deviate around three axes. It can roll from side to side; it can yaw, or swing from right to left or left to right; and it can pitch up or down. Movement round these three axes is controlled by the ailerons, the rudder, and the elevators. The ordinary aeroplane has a high degree of stability round the rolling axis, a somewhat less degree round the pitching axis, and only a low degree of stability round the yawing axis. Consequently, as long as the rudders and elevators are correctly operated by the pilot, it is hardly necessary to move the ailerons in level flight. The gyroscope provides an ideal fixed system whereby an aircraft's flight path can be automatically controlled. The gyroscope cannot of itself exert direct action on the controls when the aeroplane's flight path deviates from the true course as represented by the gyroscope's axis. But it is a comparatively

simple matter to devise a method whereby the gyroscope operates an auxiliary system sufficiently powerful to exert an influence over the controls.

The most efficient automatic pilot employs two gyroscopes: one to operate the rudder and elevators, and another to operate the ailerons. The instrument is air-driven: air being continuously removed from the containing case by a vacuum pump, and new air entering through jets to replace that exhausted by the pump. The jets are positioned to play upon the wheels of the gyroscope and revolve them at an average speed of 10,000 revolutions per minute.

When the aircraft yaws, the stationary portion of the gyroscope moves with it, but the spinning portion continues to revolve along the original fore-and-aft axis of the fuselage. This relative movement of the fuselage to the gyroscope causes a small piston attached to the gyroscope to move inside a cylinder connected to the framework. The piston thereupon operates a valve which admits compressed air to one side of a pneumatically operated servo motor (*q.v.*) linked to the rudder. This automatically applies the rudder and returns the aircraft to its original course. The piston and valve linkage are so arranged that the rudder movement is just sufficient to ensure that the off-course deviation is instantly made good by a turn in the opposite direction: immediately the aircraft returns to its original course, the turn is automatically taken off. The elevator and aileron controls operate in exactly the same manner. Some types of automatic pilot, such as the Sperry gyro control, use oil under pressure instead of compressed air to actuate the servo motors moving the controls.

Besides keeping the aircraft on a straight course and even keel, the automatic pilot can be set to hold an aeroplane in a long glide or a steady climb at any angle, or to put the aircraft into a banked turn of any steepness.

The principles of the automatic pilot were first adopted by Hiram Maxim, who incorporated a gyroscope driven by compressed air in a flying machine he built, but never flew, in 1890.

The first automatic pilot to take the air was installed in an American aeroplane in 1909. A year later Robert Blackburn, the British designer, fitted an automatic pilot in one of his early monoplanes.

Until about 1930 most appliances of the kind were too heavy for practical purposes, but today there are instruments in use weighing with full equipment little more than 50 lb. Automatic pilots now form normal equipment of all commercial air liners and of many private aircraft. They are fitted to all bombers of the Royal Air Force, and proved invaluable during the Second Great War. In conjunction with the bomb sight (*q.v.*), the automatic pilot did much to ensure the accuracy of precision bombing. By setting the automatic pilot for the most suitable angle of the bomb run, the bomb aimer was ensured of a stable platform for sighting his target.

Automatic Rifle. Rifle that fires continuously so long as the trigger is kept pressed; cocking,



Auto-matic Rifle. Handy weapon largely used in the Second Great War, especially by airborne forces

loading, firing, and ejection of empty cases being repeated automatically and mechanically as a cycle of events. The source of power actuating the automatic loading and firing mechanism is derived from the surplus energy of discharge of the explosive gases generated by the ignition of each cartridge. In some types of automatic rifle the gases directly operate a piston and spring mechanism. In other types the gases only act indirectly by assisting recoil of the barrel. In yet others, the ejection of the empty cartridge-case actuates mechanism which loads a fresh round into the chamber and releases the firing-pin. Automatic rifles can be clip or drum-fed, the magazines holding from ten to one hundred rounds.

One of the features of the war of 1939-45 was the extensive use of automatic rifles by all the belligerent armies. Most airborne parachute and assault units were entirely armed with these weapons. For accurate and rapid fire, the U.S. army developed a semi-automatic rifle called the Garçon.

This rifle fires a clip of eight .300 bullets, but requires pressure on the trigger for each shot. Ejection of the empty case and loading of a fresh round into the breech are carried out automatically by a piston actuated by pressure from the explosive gases, which assists recoil. See Rifle; Sten Carbine.

Automatic Writing. In psychological research, term used for words written without the conscious direction of the writer. It may be produced either in a state of apparent wakefulness, in trance, or in hysterical or other morbid conditions. The matter written ranges from scraps of words or sentences to long documents, and not infrequently on subjects of which the writer is not known to have knowledge. Occasionally the handwriting differs from the normal writing, being in

some cases reversed—"looking-glass" writing. The practice came into prominence in America in the middle of the 19th century and quickly spread to England. Among American automatic writings are The Great Harmonia of Andrew Jackson Davis and The Arcana of Nature

of Hudson Tuttle, both written in early youth and containing allusions to scientific facts then unknown. The Spirit Teachings of William Stainton Moses is an English example. The Rev. G. Vale Owen (1869-1931) claimed that a series of his books produced from 1921 were the result of automatic writing. See Spiritualism.

Automatism. Theory of Descartes that animals are mere automata and their actions involuntary. In physiology the term "automatic" is applied to movements which originate in the nerve-centres and are entirely uninfluenced by the will, such as the circulation of the blood and the palpitation of the heart. See Animal Intelligence.

Automaton. Literally, any automatic mechanism. Thus, a watch, a fire alarm, a motor-cycle, and many other forms of mechanical combination provided with internal motors are automata. The word, however, is generally applied specifically to an automatic machine constructed to resemble a human being or an animal and

capable of self-movement. Sometimes the name *androides* (Gr. *anēr*, man : *eidos*, form) is used to designate an automaton resembling a human figure.

So far back as 400 B.C. Archytas of Tarentum is credited with having made a wooden pigeon capable of flying. Throughout the Middle Ages there are many records or legends of automata, but it was not until the 18th century that details become sufficiently definite to allow of their being examined.

In 1738 Jacques de Vaucanson showed in Paris an automatic flute-player, a tambourine-player, and a duck which is said to have imitated faithfully the natural quack of the actual bird, and to have been able to eat and drink. Many automata were musical, and the automatic singing bird that is not uncommon today may be regarded as the commercial resultant of these early efforts to produce automatic figures. The cuckoo of the cuckoo clock may also be mentioned.

J. N. Maskelyne, the London entertainer, excelled all other producers of automata, the most remarkable being his "Psycho," produced in 1875, that played cards, chess, and draughts, and worked arithmetical problems, and "Zoë," produced in 1877, that drew portraits of any celebrity suggested. See Robot.

Automobile Association. A British society founded in London in July, 1905, to protect and



Automobile Association badge

advance the legitimate interests of motorists. The first activity of the A.A. was to overcome the indiscriminating speed traps employed by the police to enforce the arbitrary speed limit of 20 m.p.h. then operating throughout Great Britain. The famous road patrol and roadside telephone box organization came into existence; and new benefits of membership, such as free legal defence, home and foreign touring service, advice about hotels and garages in an annual handbook, mechanical assistance on the road, were rapidly introduced until by the outbreak of the First Great War the A.A. had become the world's largest motoring organization. Total membership exceeded 700,000 on Sept. 3, 1939. The head office is at Fanum House, New Coventry Street, London,

W.I. Sir Stenson Cooke (1874-1942) was secretary of the Automobile Association from its inception until his death.

Autonomy (Gr. *autonomia*, self-government). Originally the right of a state to govern itself and make its own laws. In philosophy the term is specially applied by Kant to the capacity of the reason to make moral laws for itself, as opposed to heteronomy, by which is meant the reception of its laws from some other source.

Autoplasty (Greek *autos*, self; *plassein*, to mould). Surgical operation for mending or replacing a diseased, injured, or lost part from a sound part of a patient's body. Practised in India from time immemorial, autoplasty is usually employed to remedy facial disfigurement, the operation for the nose called rhinoplasty (*q.v.*) or the Taliacotian operation being the best known. During both Great Wars great advances were made in autoplasty, and hospitals for facial wounds were opened, bone as well as skin and flesh being successfully grafted.

Autopsy (Gr. *autos*, self; *opsis*, sight). Internal examination of the body after death. A doctor may perform an autopsy or post-mortem examination to find out the exact pathological condition for purely scientific purposes, provided he has the consent of the relatives of the deceased.

Auto-Suggestion. Term used in psychology and psychotherapy. It connotes a mental process by which an idea is formulated in the subject's own mind, either involuntarily or voluntarily and deliberately, and accepted without awareness of logical grounds for its acceptance. The results may be harmful, as with a subject who convinces himself so strongly that he is diseased or injured that in effect he becomes so; or beneficial, as with one who, by convincing himself of his good health, secures it. As an exponent of the beneficial effects of auto-suggestion Emile Coué (*q.v.*) achieved repute in Great Britain during the early 1920s. Auto-suggestion and Couéism became synonymous terms, and his formula, "Every day and in every way, I am getting better and better," no doubt induced in many who repeated it a better state of mental and physical health. Though the suggestion was originally external, the idea of well-being was established by auto-suggestion.

In all ages efforts have been made to alleviate suffering by the

power of the mind, and in oriental countries, especially, auto-suggestion has been practised to a remarkable degree. The Indian yogis take flight from the burdens of existence into a world of self-absorption and remain for long spells in a self-induced trance. See Hypnotism; Suggestion.

Autotransformer. A transformer in which a single coil is utilised for both the primary and secondary windings. In addition to two end connexions there is a third tapping, at a point in the coil to give the desired voltage ratio, this tapping being common to both windings. See Transformer.

Autumn (Latin *augere*, to increase). Third season of the year. North of the equator it extends astronomically from the autumnal equinox on Sept. 23 to the winter solstice on Dec. 21 or 22; but in Great Britain, as in N. America where it is called the fall, it popularly comprises Sept., Oct., Nov. S. of the equator autumn occurs during the northern spring.

Autun. City of France, in the department of Saône-et-Loire. It stands on the river Arroux, 62 m. by rly. S.W. of Dijon. The ancient Augustodunum, it is a bishop's see (Talleyrand being bishop 1789-91), and has a cathedral begun in 1060, but mainly of the 12th and partly of the 15th century, two magnificent gateways, Porte d'Arroux and Porte St. André, dating from Roman times, and remains of walls, a temple, and a theatre.

The manufactures of Autun include cloth, machinery, and leather, and it is a market for the produce of the neighbourhood. A fair is held in Sept. on the feast of St. Lazare, the city's patron saint. In Roman times Autun was a large and important place, its rhetorical schools being especially celebrated.



Autun, France. The cathedral, notable for its fine 15th century spire

Later it became part of Burgundy. It was ravaged by the Saracens and Normans, and was burned by the English in 1379. It was part of German-occupied France from June, 1940, until liberated by French forces, Sept. 9, 1944.

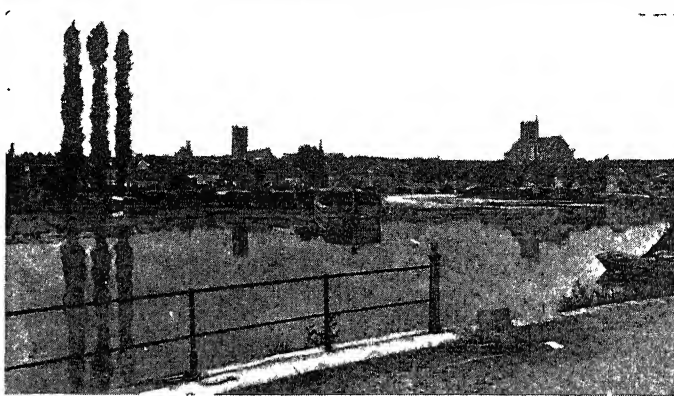
Auvergne. Former prov. of France. It is now represented by the departments of Cantal, Puy-de-Dôme, and part of Haute-Loire. The district was named after a Gallic tribe, the Arverni, who were conquered by Julius Caesar. Later it was part of Aquitaine and under the Carolingians became a county with its own ruler. For a time its overlord was Henry II of England.

By the 13th century Auvergne was divided into four parts. One of these was ruled by a dauphin and called the Dauphiné of Auvergne; the second, called the Terre d'Auvergne, was added to the crown lands by Philip Augustus; the third was the county of Auvergne, and the fourth the county of Clermont. King John II made the Terre a duchy, with his son John as duke, and later the Dauphiné and the duchy passed to the Bourbons, reverting to the crown when in 1531 the constable of Bourbon, the last dauphin of Auvergne, was declared guilty of treason. The county became crown property in 1615, having been held for two centuries by the family of La Tour. Until the Revolution Auvergne was a government in two parts, Upper and Lower, with their respective capitals at Aurillac and Clermont.

The W. contains the Auvergne Mts. which rise from the general level of the great plateau of central France, and are of volcanic origin. Enormous streams of lava cover many sq. m. of country. The peaks, Puy de Dôme, 4,800 ft., Plomb du Cantal, 6,093 ft., Pic de Sancy, 6,188 ft., are extinct volcanoes, and mainly composed of ashes and lava blocks; in some cases the crater is well preserved, in others it has been completely broken away on one side. The E. slope drops somewhat steeply to the valley of the Upper Allier.

Aux Cayes. Seaport of Haiti. On the S. coast, 93 m. S.W. of Port-au-Prince, it is a bishop's see, and is the port from which Bolivar set out in 1816 to liberate the S. American colonies from the Spanish yoke. It exports coffee and logwood. Cargo is landed by means of lighters. Pop. 11,875.

Auxerre. Town of France, the capital of the department of Yonne. The ancient Autissiodorum, it stands on the river Yonne, 105 m. by rly. S.E. of Paris. Until 1790



Auxerre, France. General view of the capital of the department of Yonne, as seen from the river Yonne

Auxerre was the seat of a bishop, and its Gothic cathedral, known as the church of S. Etienne, dates from the 13th-15th centuries. It has finely sculptured portals, magnificent rose windows, an exquisite Gothic choir beneath which is an 11th century crypt, and contains many fine pictures. The church of S. Eusebius dates in part from the 12th century, the nave and steeple being of that period. The W. façade was added in the 13th century, and the choir, which has some beautiful painted glass, was begun in 1530. The church of S. Pierre dates from the 17th century. Other buildings are the episcopal palace, now the prefecture, the old law court, and a 15th century gateway and tower. Remains exist of the abbey of S. Germain, but the fortifications have been replaced by boulevards. S. Germanus, a 5th century bishop, won in Britain a victory for the Christians over the Picts. Wine, ochre, woollen goods, leather, and bricks are made. Pop. 22,900.

Auxiliary Air Force. This R.A.F. equivalent of the Territorial Army became in 1947 the Royal Auxiliary Air Force (*q.v.*).

Auxiliary Ambulance Service. British civil defence unit. It was set up in 1938 to deal, in conjunction with existing civil ambulance services, with the anticipated large number of air raid casualties in the event of war. Vehicles were requisitioned and improvised as ambulances, but on Jan. 10, 1939, the ministry of Health circularised local authorities detailing the types of vehicle to be employed, and by the end of 1940 a high standard of equipment had been attained. The ambulances used for collecting casualties took two or four stretchers; for the transfer of large numbers from one hospital to another,

specially converted single-decker buses were used. Every ambulance had first aid and anti-gas kit and both driver and attendant were qualified in first aid.

At the height of the German air raids, the service operated some 15,000 ambulances for stretcher cases and 18,500 private cars adapted to carry sitting cases. Personnel numbered 32,867 men (9,348 full time) and 43,940 women (13,765 full time). All drivers received a course of night driving without lights and in respirators, and were also given instruction in direction finding. See Ambulance.

Auxiliary Cruiser. Passenger liner taken over in time of war by the Royal Navy and fitted out as an unarmoured warship for contraband control and patrol and escort duties. The most suitable types of vessels are liners of 15,000 to 20,000 tons, with a speed of 16 to 20 knots. Armament usually consists of a main battery of 6-in. guns, the number mounted depending upon the size of the ship. Auxiliary cruisers in the Second Great War carried a secondary armament of 4.5-in. A.A. guns, together with Orlikons and multiple machine-guns. The ships normally carried a mixed crew of merchant seamen and reservists and pensioners of the Royal Navy, R.N.R., and R.N.V.R. Being unarmoured, auxiliary cruisers had to depend for protection upon their somewhat limited speed. After 16 of these ships had been lost in 1939-42. they were nearly all refitted as transports, etc. See Armed Liner; Defensively Equipped Merchant Ship; Jervis Bay; Rawalpindi.

Auxiliary Military Pioneer Corps. This unit of the Second Great War is described under the heading Royal Pioneer Corps.

AUXILIARY TERRITORIAL SERVICE

Chief Controller Dame Leslie Whateley

This important women's service was in 1949 given the name Women's Royal Army Corps. Its development and activities during the Second Great War are here described by a former director.

As a direct result of the contribution made by Queen Mary's Army Auxiliary Corps in the First



Badge of the Auxiliary Territorial Service

Great War discussions took place in 1937 about the formation of a women's peacetime service, the object being to release as many soldiers as possible from non-combatant duties, in the event of war, in units other than field force formations. In 1938 these discussions turned to the actual lines upon which such a service should be organized, and the following major decisions were reached:

(1) To raise through the Territorial Army Associations a voluntary peacetime women's service entitled the Auxiliary Territorial Service. (2) The Parliamentary under-secretary of state for War would be the responsible member of the Army Council with the assistance of the deputy director-general Territorial Army and an Advisory Council. (3) Women would undertake a general or local service obligation, the former implying service anywhere at home or abroad the latter in the neighbourhood of their homes, as cooks, clerks, orderlies, storewomen, and drivers. (Local service enrolments ceased early during the Second Great War owing to their impracticability. The Women's Transport Service (F.A.N.Y.) were to supply motor driver companies for the transport side of the A.T.S. In 1940 these were incorporated in the A.T.S.). (4) Women would be enrolled, not enlisted. Officers would not be commissioned. Special rank badges and titles would be introduced. (5) Age limits would be 18 to 43 years with an extension to 50 for ex-service women. (6) Companies would be raised on a county basis under a woman commandant nominated by the president of the County Territorial Association and appointed by the War Office—these companies to be affiliated to military units. (7) A number of companies would be formed for work with the R.A.F. In July,

1939, these companies ceased to be A.T.S., and formed the nucleus of the new service, the Women's Auxiliary Air Force.

The Munich crisis considerably precipitated action and on Sept. 9, 1938, the formation of the A.T.S. was proclaimed by Royal Warrant and publicly announced on Sept. 27, at the height of the crisis.

On Oct. 10, 1938, an officers' school of instruction was set up. Courses of one week's duration were run until the outbreak of war. By that time over 1,000 officers had passed through. Other ranks undertook to attend a minimum of ten evening "drills" and one week's summer camp in alternate years. The first camps took place in the summer of 1939, but many were curtailed by the outbreak of war; and when the service, some 17,000 strong, was mobilised, training came to an end. Within two to three months, however, officers' and n.c.o.s' schools were set up under A.T.S. instructors, and recruit training centres opened to deal with the steady flow of volunteers.

In June, 1939, the War Office had decided that the appointment of a woman as director and head of the service should be made under the director-general Territorial Army. At the outbreak of war the appointment of D.G.T.A. ceased to exist, and the A.T.S. directorate came directly under

the Adjutant-General. This staff was augmented as the service grew. Accordingly on July 3, 1939, Dame Helen Gwynne-Vaughan had assumed office with the rank of chief controller, equal to a major-gen. Her staff was to consist of one assistant director with the rank of chief commander, equal to a lieutenant-col., and two junior officers. Pay was agreed at two-thirds the male rates, but this decision was not published until after mobilisation had begun.

Soon after war was declared H.M. Queen Elizabeth accepted the office of commandant-in-chief with the corresponding rank of lieutenant-gen. In Feb., 1940, H.R.H. the Princess Royal, who had joined the service soon after its inception, became hon. col. with the rank of chief controller.

It became evident in 1940 that the A.T.S. would benedict in ever-increasing numbers and in more employments than the original five laid down. Women were already being trained to take over many duties performed by the Royal Corps of Signals. In the spring the first A.T.S. units were posted to France. They included bi-lingual switchboard operators who left Paris only as the Germans entered that city.

In Great Britain the A.T.S. met the emergency caused by the return of the men from Dunkirk by working day and night to feed and re-equip them. As a direct result demands poured in from all branches of the army for more A.T.S.

In April, 1941, the A.T.S. received recognition by being given equal military status with the men of the army, and becoming part of the armed forces of the crown. Their officers received the royal commission. All ranks wore the same badges of rank as the army, and other ranks had the same titles, whilst officers assumed the following:

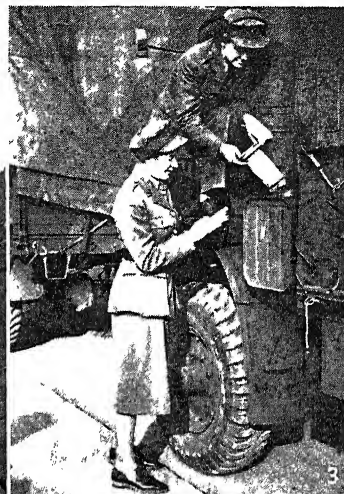
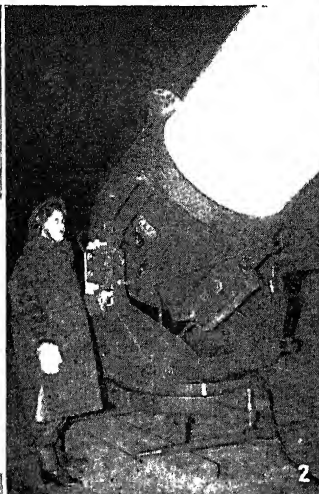
Chief Controller	=	Major-Gen
Senior "	=	Brigadier
Controller "	=	Colonel
Chief Commander	=	Lieut.-Col
Senior "	=	Major
Junior "	=	Captain
Subaltern	=	Lieutenant
2nd Subaltern	=	2nd Lieut

In the House of Commons on April 10, 1941, the secretary of state for War said:

The Auxiliary Territorial Service has proved so valuable to the army in replacement of men that the government have decided to increase its numbers greatly and to enlarge the range of duties which it per-



Chief Controller L. E. Whateley, Director of the A.T.S. 1943 to 1946, and made D.B.E. Jan. 1, 1946



1. Girls of the A.T.S., working on an A.A. gun-station as spotters, use an identification telescope; they wear a special winter outfit. 2. Some searchlight batteries were worked entirely by A.T.S. personnel. 3. Convoy driver taking over a new lorry from a

factory for delivery to a distant depot. 4. A.T.S. trainees learn how to march. 5. Physical training class. 6. Drivers in training receive a lesson in road sense. 7. Class of officer cadets is here being given instruction on the composition of the British army

AUXILIARY TERRITORIAL SERVICE · WOMEN IN TRAINING AND IN ACTION

forms. Members of the service are already discharging important functions connected with the air defence of Great Britain as well as with the rest of the forces at home, and these are of a character which renders it desirable that the volunteers performing them should be definitely declared members of the armed forces of the crown. The whole service will accordingly be given full military status. Women will, of course, be employed only on work for which they have a special aptitude, but the House should know that such work includes duties at searchlight and gun stations. The service will remain a women's service under the general direction of women, and the disciplinary code of the army will be applied to it only in so far as the wider responsibilities now envisaged necessitate.

The first of many heavy anti-aircraft mixed batteries (Royal Artillery) was formed in 1941, the women taking an equal share in all duties except actually firing the guns. On July 21, 1941, the first chief controller retired, and was succeeded by Mrs. J. M. Knox.

Conscription Introduced

The problem of man power was increasingly acute in 1942, the need for more men in the fighting lines growing correspondingly. So came for the first time in history conscription for women. The Army Staff College opened a wing for training A.T.S. officers who were later to serve in almost every theatre of war in replacement of male staff officers.

By Oct., 1943, when Chief Controller Knox retired, to be succeeded by the deputy director, Senior Controller L. E. Whateley, the strength of the A.T.S. had risen to 214,000, serving throughout the U.K., Middle East, Africa, U.S.A., and N. and S. Caribbeans.

The types of work had steadily increased to include 88 army trades and 36 non-tradesmen employments. The following abbreviated list gives an idea of the scope: A.A. operational and non-operational, A.T.S. administration, bakers, chiropodists, cinema projectionists, clerks (all types), cooks, dispensers, draughtswomen, drivers, education instructors, hairdressers, kine theodolite operators, masseuses, mess stewards, orderlies (general duties, medical, nursing, dental, railway), provost duties, R. Signals duties, and storewomen.

A.T.S. were posted to N. Africa in 1944, proceeding later to Italy to form the nucleus of a large contingent. In Aug., A.T.S. once more landed in France and later in Belgium. At the beginning of

1945 H.R.H. Princess Elizabeth joined the service as a 2nd subaltern, later being promoted to the rank of junior commander. A.T.S. commitments increased to include service in the Far East and with the armies of occupation.

Demobilisation was on precisely the same lines as for the army, with the exception that married women could obtain early release.

The A.T.S. had a special status because of its composition, the general policy being to preserve the feminine qualities of its members.

The A.T.S. regulations (1941) stated that the D.A.T.S. had the right of appeal direct to the secretary of state for war; that all matters affecting only the A.T.S. as a women's service should be dealt with solely through A.T.S. channels; that any matter affecting the A.T.S., however technical, should not be dealt with through exclusively military channels; that in all matters affecting both the A.T.S. and the military there should be the closest cooperation between the A.T.S. officer and the military commander concerned.

On Feb. 1, 1949, the A.T.S. was renamed the Women's Royal Army Corps.

Auxins. Substances which regulate the growth of plants. They are formed especially in meristems and diffuse to the regions where cell enlargement takes place. Their presence accelerates elongation of stems and retards that of roots. By their differential distribution under the influence of gravity or one-sided light they bring about curvatures which occur in geotropism (*q.v.*) and heliotropism (*q.v.*).

Auxonne. Town of France, in the dept. of Côte d'Or. The ancient Assonum, it stands on the Saône, and is 20 m. by rly. S.E. of Dijon. The 14th century church of Notre Dame, built on the site of an 11th century building of which only one tower remains, has a fine 16th century porch. Other buildings are the hôtel de ville, the arsenal, now used as a market, and a fortified château, now the barracks. It has an interesting gateway, and remains of fortifications restored by Vauban in 1673. In the Place d'Armes there is a statue of Napoleon I, who as a sub-lieutenant was quartered here in 1788. The trade is mainly in agricultural produce, and the manufactures include textiles, leather, bricks, and plaster of Paris. In the later Middle Ages Auxonne belonged to Burgundy. Besieged by the Allies in 1814, it capitulated to the Austrians in 1815. Pop. 21,000.

Ava OR KAVA. Root of *Macropiper methysticum*.

A native of Polynesia, it is used as a medicine in rheumatic complaints. The juice fermented becomes an intoxicating drink, and if used to excess produces various diseases of the skin. In the Sandwich Islands a similar drink with the same



Ava. Plant of Polynesia

name is produced from the root of a species of the genus *Cordyline*.

Ava. Ruined city of Burma. It stands on the Irawadi river, here about 4,000 ft. wide, opposite Sagaing, and 10 m. S.W. of Mandalay. Founded in 1364, it became the capital of the Burman empire, and remained so until Amarapura superseded it in 1782. In 1823 it again became the capital, but 14 years later the seat of government was again established at Amarapura. Although Ava is now an insignificant place with few inhabitants, at the height of its prosperity it had a circumference of about 10 m. and a pop. of more than 45,000. It is surrounded by walls, and has several Buddhist temples, crowned by gilded domes, which give it a false appearance of grandeur when viewed from a distance. Its temples and palaces were destroyed by earthquake in 1839. Lord Dufferin, Viceroy of India, 1884-88 took the title of marquess of Dufferin and Ava.

Ava was taken by the Japanese in their drive towards Mandalay at the end of April, 1942. It was recaptured by British troops of the 14th army on March 19, 1945, when they crossed the Ava road-rail bridge (1,200 yds. long) and took up positions along the S. bank of the Myitnge river.

Avalanche (Lat. *ad*, to; *vallis*, valley). Fall of masses of snow or ice or large quantities of earth from mountain slopes to the valleys. Snow which falls on steep mountain slopes evaporates, melts, and runs away as water, or remains as snow. That which remains is in so unstable a condition that when a further fall occurs the additional weight sets the whole mass in motion and sends the snow, accompanied by loose earth and rocks, crashing into the valley. Such avalanches are common in all

high mountainous districts. It is estimated that one-third of the total snow fall in the S. Gotthard region disappears in this manner.

An avalanche also occurs when quantities of ice break away from a glacier and rush down the valley. Such a slide in 1901 overwhelmed a village on the road over the Simplon Pass and killed all the inhabitants. Rock avalanches occur when large masses of rock fragments slide down mountain slopes. See Glacier.

Avallon. Town of France, in the dept. of Yonne. On the river Cousin, on the slopes of the mts. of Morvan. It is 34 m. by rly S.E. of Auxerre, and contains the 13th century church of S. Lazare, a 15th century gateway with tower, and remains of fortifications. Its industries include woollen manufactures, tanning, and distilling. As Aballo, Avallon was a Roman town; it was afterwards part of Burgundy. Pop. 5,900.

Avalon. In Celtic mythology, place of rest and reward for departed heroes, similar to the Valhalla of the Norsemen. In it were magical apples, recalling the golden apples of the Hesperides, and a mystic fountain. Thither, according to the Arthurian legend, King Arthur was taken to be cured of his wounds. Ancient legend described it as a green isle in the west; one conjecture identifies it with Glastonbury in Somersetshire. Tennyson terms it the island valley of Avilion. See Arthur.

Avare, L' (The Miser). Five-act comedy by Molière. A free handling of the *Aulularia* of Plautus, the plot is subordinated to the characterisation of Harpagon (the Euclio of Plautus), the wealthy usurer in whom avarice usurps the place of natural affection. The play was produced at the Palais-Royal, Paris, Sept. 9, 1668, Molière taking the part of Harpagon. See Molière.

Avaris. Ancient city of Lower Egypt. Sometimes identified with Tanis, it stood E. of the Nile delta. Long a stronghold of the Hyksos or shepherd kings, it was captured by Aahmes (Amasis) I, the founder of the XVIII dynasty. See Egypt: Ancient History.

Avars. People belonging to Asiatic races commonly called Tartar, Mongolian, or Turanian, who poured in succession into Europe during the early Middle Ages. The Avar group became powerful during the 6th century, and disappeared in the 9th. As with the Huns before them and the Magyars after them, the seat of their dominion was on the middle Danube and in Hungary. In the 6th century Justinian paid them to guard



Avalanche. Fall of snow and rock from a mountain height into an alpine valley. Avalanches sometimes overwhelm whole villages.

the northern frontiers of the empire; they joined hands with the Lombards in destroying the Teutonic Gepidae; at the end of the century they repeatedly raided over the Danube. In 610 they burst into the Lombard plain of N. Italy, but were content to ravage and retire. In 618 they were in Bulgaria, and in 626 unsuccessfully besieged Constantinople. They were pushed back across the Danube, but continued to dominate a great part of central Europe, though they failed to organize a consolidated empire.

In 788, shortly after Charlemagne became king of the Franks, Avar chiefs broke over both the Italian and Bavarian borders. The challenge was accepted by Charlemagne, who was bringing both Bavaria and Lombardy under his own supremacy. Charlemagne himself invaded their territory, and

by 805 their resistance was completely broken. The emperor set up one of their own chiefs as khan of the Avars and vassal of the empire; but after his death his successors could not maintain their control, and the Avars were wiped out or absorbed by the Magyars, who set up their own empire. See Hungary.

Avatar (Skt. *avatāra*, descent). In Hindu mythology, an earthly manifestation or incarnation of a deity. The word also expresses the embodiment of an idea.

Avatcha. Bay on the S.E. coast of Kamchatka. It is the finest harbour of the peninsula. On an inner bay stands Petropavlovsk, and N. is the active volcano of Avatcha, with two peaks, 10,000 ft. and 8,500 ft. high.

Avebury or **ABURY.** Parish and village of Wiltshire, England, 7 m. W. of Marlborough. It contains the ruins of a supposed Druidical

temple, a large outer circle of stones and two lesser inner circles, forming one of the most remarkable examples of stone monuments in the United Kingdom. The stones vary from 5 ft. to 20 ft. in height, and from 3 ft. to 12 ft. in thickness, and the diameter of the outer circle is about 1,400 ft. Late Neolithic is the period suggested. Sir John Lubbock took his title from here. Pop. 561.

Avebury, JOHN LUBBOCK, 1ST BARON (1834-1912). British banker and scientist. Born in London,



Century

April 30, 1834, the eldest son of Sir John William Lubbock, Bart., and educated at Eton, he entered the banking house of Robarts, Lubbock & Co. in 1848 and succeeded his father as head of the firm in

1865. He was Liberal M.P. for Maidstone, 1870-80, and for London University 1880-1900, sitting as Liberal-Unionist from 1886. In 1900 he was raised to the peerage.

His chief work in Parliament was the Bank Holidays Act, 1871, but he was also mainly responsible for the Shop Hours Regulation Act, 1886, and the Bills of Exchange Act, 1904. He was president of the British Association, 1881, vice-chancellor of London university, 1872-80, chairman of the London County Council, principal of the London Working Men's College, 1890-92, and president of the Central Association of Bankers. His many writings on popular natural history include *Ants, Bees, and Wasps*; *On the Senses, Instincts, and Intelligence of Animals*; and *Flowers, Fruits, and Leaves*. His most popular works were *The Use of Life* and *The Pleasures of Life*. He died at Kingsgate, Thanet, May 28, 1912. *Consult* Life and Work, ed. Mrs. A. G. Duff, 1934.

Aved, JACQUES ANDRÉ JOSEPH CAMELOT (1702-66). A French painter. Born at Douai, of Flemish parents, Jan. 12, 1702, he studied first at Amsterdam under Bernard Picart the engraver, and afterwards at Paris under Alexis Simon Belle. Among his more notable portraits are those of Louis XV, the stadtholder William IV, J. B. Rousseau the poet, the marquis of Mirabeau, Mme. Crozat, Mme. de Tencin, and the Marshal Clermont-Tonnerre. Aved died in Paris, March 4, 1766.

Aveiro. Town and episcopal see of Portugal, in the old prov. of Beira. Capital of the district of Aveiro, it is on the river Vouga, 40 m. by rly. S. of Oporto, and is connected by canal with the Atlantic. It exports salt, sardines, fruit, wine, and oil. It was the birthplace of John Affonso, the Newfoundland navigator, and at one time sent 60 ships yearly to the fishing-grounds of that coast. In 1919 it was concerned in the futile attempt to restore the monarchy. Pop. 10,357.

The district of Aveiro, formed from the N.W. part of the prov. of Beira, has an area of 1,065 sq. m. and a pop. of 429,870.

Avellaneda. Town of Argentina, in the prov. of Buenos Aires. On the river Riachuelo, it is connected by rly. with Buenos Aires. An important manufacturing town, it has a handsome town hall, a fine market hall for agricultural produce, and cold storage and meat-canning industries. It gives its name to a dept. with a pop. of 394,787.

Avellino. Province of Italy, in Campania. It contains the highest portion of the Neapolitan Apennines, has an uneven surface, and covers 1,165 sq. m. In its fertile valleys large quantities of chestnuts and hazel-nuts are grown. The capital is Avellino. Pop. 422,743.

Avellino. City and episcopal see of Italy, capital of Avellino province. It is 59 m. by rly. E. of Naples and has a ruined 10th century castle, a cathedral, and a college. It manufactures linen, hats, boots, paper, and sausages, and is noted for hazel-nuts. Founded in the 9th century, it is named from the ancient Abellinum, some 3 m. to the N.E., with ruined town walls and amphitheatre. On Monte Vergine, at the base of which Avellino stands, is a 12th century convent, the church of which contains a miraculous picture of the Virgin. Pop. 29,091.

Ave Maria (Hail, Mary!). Latin form of the opening words of the Angel Gabriel's salutation of the Virgin Mary (Luke 1), and the familiar name of the prayer or form of devotion, known also as the Angelical Salutation, introduced as it now stands into the Roman Catholic breviary in 1568. Schubert, Gounod, and other composers have set the prayer to music. *See* Rosary.

Avanches. Town of Switzerland, in canton Vaud. The ancient Aventicum, it is 5 m. S.W. of Morat, and contains a medieval castle, a museum, and remains of

Roman walls and an amphitheatre. One of the chief towns of the Helvetii, Avanches became a Roman colony, but was destroyed by the Huns in 447.

Avenger of Blood. Ancient Hebrew institution based on the words in Gen. 9: Whoso sheddeth man's blood, by man shall his blood be shed. The execution of the sentence was held to devolve on the nearest male relative of the person slain. If this relative, called the Goel, failed, the duty passed to the next-of-kin, who was known as the Megol. To provide protection for those guilty of accidental homicide, cities of refuge were provided (Num. 35). Similar institutions to Goelism, or obligations of kinship, existed among the Greeks, Scythians, and Teutonic tribes. The custom of retaliation for bloodshedding still prevails among the Arabs, being sanctioned by the Koran (Sura 2). *See* Blood Feud; Kinship.

Avenol, JOSEPH (b. 1879). French economist. While still young he established a reputation as a financial and economic expert, being appointed secretary-general of French finances in 1905. From 1916 to 1923 Avenol was financial delegate for France in London. In 1923 he became deputy secretary-general of the League of Nations, being sent by the League to advise the Nanking government on financial reconstruction. He became secretary-general of the League in July, 1933, resigning on July 26, 1940.

Avens. Name of two species of Geum, common avens or herb bennet (*G. urbanum*) and water avens (*G. rivale*), perennial plants of the order Rosaceae. The first named is a common plant in copses and hedgerows in Britain, and has boldly dissected leaves from the rootstock, the uppermost leaflet of which is much larger than the others. The bright yellow, buttercup-like flowers are succeeded by a head of nutlets, each ending in a long hooked awn. Water avens, which grows beside streams and in damp copses, has much larger, drooping flowers with dull purple calyx and orange petals.

Aventine Hill (Latin *Mons Aventinus*). One of the seven hills of ancient Rome, inhabited chiefly by plebeians. *See* Rome.

Aventinus (1477-1534). Latinized name of the Bavarian historian Johannes Thurmayer. The name Aventinus is derived from Aventinum, the Latin name of his birthplace, Avensberg, in Bavaria. The son of a publican, he was educated

at Ingolstadt, Vienna, and Paris, and taught at Vienna and Cracow. In 1509 the duke of Bavaria, Albert the Wise, made him tutor to his two sons. In Munich Aventinus composed the seven books of his History of Bavaria (Annales Boi-orum), publ. 1554. He died Jan. 9, 1534, at Regensburg (Ratisbon), where a monument was erected to him in 1861.

Aventurine (Italian *avventura*, chance). Variety of naturally occurring silica used as an ornamental stone. It consists of chalcedonic silica or crystalline quartz, traversed by innumerable minute fissures that reflect light and produce a spangled appearance, and is usually reddish-brown or greyish-brown in colour. Artificial aventurine is made in the form of coloured turbid glass in which are enclosed spangles of finely divided mica. It is called aventurine from having been accidentally discovered.

Avenue Theatre. Former London theatre, in Northumberland Avenue, W.C. It was opened March 18, 1882, with a revival of Madame Favart. Here, in 1890, George Alexander made his first entry into management. The theatre was largely wrecked in 1905 by the fall of part of Charing Cross railway station. It was rebuilt and is now known as The Playhouse (*q.v.*).

Average. Business word used in two distinct senses. Ordinarily, an average is the mean proportion, or the arithmetical mean, of a number of figures. Thus, the average number of hours of sunshine or the average earnings of a workman over a certain period, are calculated by adding the whole together and then dividing the sum by the number of days or weeks, the answer being so many hours a day or so many pounds a week *on the average*. The whole business of insurance is based on averages: life insurance on the average ages at which a number of persons may be expected to die, fire insurance on the average number and size of the fires which experience tells may be expected in a certain area and period. A dealer in stocks and shares calls it averaging when he buys more of a particular share at a price lower than that which he gave for his previous holding.

Common instances of averages are exemplified in the following statements: the annual net profits exceeded 25 p.c.; the density of population lies between 200 and 250 per sq. m.; the consumption of coffee in Sweden exceeds

that of the United Kingdom per head of the population. In using averages it is important that the values averaged should be strictly comparable; it is of little use to say that the average height of a man, a horse, a rabbit, and a mouse is 3 ft., but it may be so to know that the average height of Scandinavians exceeds that of Italians.

In international maritime law the term originally meant the contribution made by all to the loss sustained by one. The case arose when, to lighten a ship in a storm, certain goods had to be cast overboard to save the ship and the rest of the cargo. The owners of ship, freight, and cargo saved had to contribute *pro rata* to make good the loss of the cargo jettisoned. Average is either general or particular. General average acts are always acts of man, and must be done by or with the authority of the master of the ship, *e.g.* cutting away the masts in a storm. Such acts must be for the common good of the whole adventure and to avert the loss of it, and must be done under imminent danger. Again, certain expenditure is general average, to be borne by all interested, *e.g.* payments made to another ship for towing the ship out of a position of great danger. Particular average applies to every kind of partial loss happening to either ship or cargo, *e.g.* if masts snap by force of the sea and winds.

In fire insurance average means that if the value of the goods covered at the time of the fire exceeds the amount of the policy, the assured only receives an amount in proportion to the value of the goods. Thus, if one insures his furniture for £1,000, and has £2,000 of furniture in the house, and £500 worth is destroyed, he receives as 2,000 : 1,000 :: 500 ; that is, he receives £250. Policyholders should make a condition, "general average excluded."

The word, from late Lat. *averagium*, is probably ultimately connected with Lat. *habere*, to have; in Fr. *avoir*, Ital. *avere*.

Averno or **AVERNUS**. Lake of Italy, in Campania. The ancient Lacus Avernus, it is 10 m. W. of Naples, and stands at the N.W. foot of Monte Nuovo. An old volcanic crater, about 2 m. in circumference, 212 ft. deep, and only 2 ft. above sea level, it now has a wall all round it. Agrippa, in 37 B.C., made it a naval harbour, connecting it with the sea by a canal to Lake Lucrino (*q.v.*). The upheaval of Monte Nuovo in 1538 destroyed the canal and harbour,

and altered the face of the surrounding district. The lake was regarded by the ancients as the entrance to the infernal regions, and the steepness of its banks gives point to Virgil's *facilis descensus Averno* (easy is the descent to Avernus).

Averroës (1126-98). Name given to the Arabian philosopher and physician Abul ibn Roshd. Born at Córdoba, he was cadi of his native city and a favourite of the emperor of Morocco. Suspected of heresy, he was exiled, but again summoned to Morocco, where he died Dec. 12, 1198.

Well known as a commentator on Aristotle, he combined religious belief with a philosophy compounded of Aristotelianism and neo-Platonism. He explains everything by a series of emanations, the last of which is the divine intellect, the active intelligence which enters into contact with man's passive intelligence (the soul). Thought is the result of the union of these two principles. See Philosophy.

Avers or **AVERSER** **THAL**. Valley of Switzerland, in the canton of Grisons. It is 6,397 ft. high and is one of the highest inhabited valleys in Europe. Cresta-Avers, the chief village, has a sanatorium. The Averser Rhein is one of the Rhine head-streams.

Aversa. Town of Italy, in Naples prov. Connected by rly. with Naples 12 m. S., it is the seat of a bishopric. Its cathedral and church are both partly Norman, and it is noted for wine and oranges. It was the scene in 1345 of the assassination of Andrew of Hungary, husband of Joanna, queen of Naples. Pop. 23,203.

Avery, CHARLES HAROLD (1867-1943). British writer of juvenile stories. He was born at Head-



Harold Avery,
British author

less Cross, Worcestershire, and educated at New College, Eastbourne. His works were almost wholly boys' school tales, of conventional type, unexceptionable in moral tone, and rich in humour. Through a period of almost 50 years his output of books and of short stories contributed to magazines for boys was remarkably large. The Dormitory Flag, 1905, was long a juvenile "classic." He died Sept. 25, 1943.

Aveyron. Department of southern France. It forms the southern portion of the central plateau, and the rivers Lot, Tarn, Viaur, and Aveyron flow through it to the Garonne. The limestone plateau is typical Causse country, with sink holes, subterranean streams, and caves rich in stalactites. The rivers flow in cañons and the promontories are called *causses*. The chief industries are mining, the making of cheese and wine, and the rearing of sheep, mules, and cattle. Owing to the poverty of the soil its corn crops are not rich. Coal is the mineral chiefly worked, while lead, iron, and zinc are also found. Rodez is the capital, and the area is 3,385 sq. m. Pop. 314,682.

Aviary (Lat. *aviarium*). Cage or enclosure for keeping birds in captivity. Aviaries have been in use at least since the days of the Roman empire, and have been popular in most civilized nations. They range in size from the small wire cage to large netted enclosures containing trees and shrubs, where a large number of birds can live under fairly natural and healthy conditions. Every aviary should afford sufficient opportunity for exercise, and if possible should admit of flight. Whether large or small, an aviary should be constructed entirely of metal, which can be easily cleaned and affords no harbour for vermin, and should contain a number of perches of such thickness that the birds can comfortably grasp them. When practicable, growing shrubs are far preferable to artificial perches. An abundant supply of frequently changed water should be provided for bathing and drinking. The birds should be protected from cold draughts, and when the aviary is exposed to sunshine care should be taken to provide shady corners.

In the matter of food, the natural habits of the inmates should be studied and vitamins provided. It is wrong to associate birds which are natural enemies, and it is inadvisable to place small birds with larger ones.

From 1933 almost all British wild birds have been protected and may not be taken, bought or sold, or put into captivity (see *Birds: Protection*, p. 1170). Only birds bred in captivity can therefore be introduced into or kept in an aviary in the U.K. When foreign birds, such as parrots, mynahs, and the tropical finches, are kept in aviaries special care is needed to protect them from the weather in winter.

AVIATION, CIVIL : FLYING & GLIDING

Captain Norman Macmillan, M.C., A.F.C., A.F.E.Ae S

This is a survey of all that is involved in the development of civil flying, not including the great air lines for passengers and freight, which are dealt with under Airways. A guide to the identification of civil aircraft by the registration markings is added. See also Aeronautics; Aeroplane; Air Law; Air Transport; Flight

There are ten main groups of air operation in civil aviation. These are: (1) test and research; (2) school and club (power flying and gliding); (3) private; (4) passenger charter; (5) freight; (6) ambulance; (7) national air lines; (8) continental air lines; (9) intercontinental air lines; (10) transoceanic air lines. For the last four groups see *Airways*.

On the non-flying side, civil aviation covers an even wider field: (1) technical research; (2) design; (3) manufacture of aircraft and ancillary parts; (4) lecturers; (5) ground engineers; (6) airfield hands; (7) airfield operational staff; (8) customs and excise; (9) government and operating companies' technical divisions; (10) government and operating companies' control staffs; (11) medical staff; (12) fuel supply; (13) surface transport to connect with air; (14) hotel and catering for air travellers; (15) airfield architects and constructors; (16) air consultants; (17) air journalists.

There is scarcely any industry or form of transport with which civil aviation is not interconnected in some part of its complex structure.

Combining for Development

In the test and research branch of civil aviation, manufacturers and operating companies combine to develop and produce aircraft most suitable to meet the needs of a group of operating companies, or sometimes of a principal monopoly organization. With few exceptions the most successful aircraft have been developed when there has been competition in the operational field, but with the increasing size of aircraft and the consequent rise in costs for research and prototype production, the tendency, even in the U.S.A., has been for operating companies to pool their experience and resources when a new transport aircraft is to be developed. The necessity for this collaboration is indicated by the high initial cost of large modern aircraft: for example, the Douglas DC-7 86-passenger 70-ton air liner prototype cost £250,000 to produce (the type was never manufactured).

Occupations in civil aviation are varied. Test pilots are almost

exclusively employed by aircraft and engine manufacturers, but some instrument manufacturers also employ test pilots to carry out research work in flight. Salaries vary in accordance with the risk to be run and the technical skill required (e.g. for prototype research against production flight test). In the larger aircraft test crews include observers and flight engineers in addition to pilots. Experienced air line pilots are sometimes called upon to carry out operational test flights.

Educational Schemes

Civil flying schools employ flying, navigation, and engineering instructors who give training for all occupations connected with the air and ground operation of civil aircraft. Some are run as colleges with resident students. The Society of British Aircraft Constructors offers well-paid scholarships annually to young people who normally could not afford to study for careers in civil manufacturing aviation; this scheme brings into the industry the best brains from a wide section of the people.

The school of aeronautics at London university, enabling aeronautical students to take a B.Sc. degree in aeronautics, was closed during the Second Great War, but in 1942 alone 1,400 American men and women took aeronautical degrees in the U.S.A.

In 1943 the British government asked the Aeronautical Research committee to explore the possibility of founding a school of aeronautical science, to train for civil aviation; and in 1945 the College of Aeronautics was duly founded.

The private aircraft owner provides scope for the smaller manufacturer and the person who is prepared to serve in the capacity of personal or company's pilot, possibly for a firm that maintains its own air communication service for the transport of directors and staff. The technical development of aviation and the raising of safety standards demand a high degree of skill and knowledge from pilots who undertake this work.

Charter flying is mostly run by private companies, seldom in the hands of the individual pilot, not even on the basis of hire on a sharing basis often employed for city motor taxi businesses. The

stringent regulations governing civil aircraft operation almost preclude the successful operation of a one-man air taxi business.

Air freight may be run on a charter basis on regular routes, or on a pick-up basis carrying freight anywhere to customers' requirements. The second enterprise is similar to air ambulance work, which depends on the incidence of illness and the difficulties of removing cases by surface transport. The ambulance service to the Hebrides has saved many lives by taking patients swiftly to the hospitals of the large Scottish cities.

The headings denoting non-flying activities in civil aviation indicate sufficiently the wide range of allied ground work, wherein a great number of specialists are required. To the list given might be added flying salesmen and flying maintenance crews of the larger companies making aircraft and associated equipment. These men must be prepared to travel and live wherever their services are required: they have exceptional opportunities for seeing the world both from the air and on the surface. They are usually recruited from persons having long experience with the firms employing them, or with similar concerns.

Increase of Civil Aircraft

(Civil aviation covers the widest field in operational aeronautics, from gliders costing about £200 to £300, up to the largest air transports costing tens of thousands of pounds. Before the U.S.A. entered the war in 1941 there were 500 air transport aircraft and 25,000 privately owned aircraft in service with U.S. citizens. Such was the immediate growth in civil aviation after the war that even by mid-1946 there were 5,500 aircraft registered for non-scheduled (charter) operation in that country; the number of aircraft in private ownership increased in much the same proportion. Yet to produce the aircraft estimated for 1950, a one-shift manufacturing industry, representing only from 10 to 15 p.c. of the 1944 war-inflated aircraft industry in the U.S.A. (i.e. about five times greater than the pre-war industry), would suffice.

It is unlikely that British output of private aircraft can reach the same scale of production, for the U.K. market is much smaller, both in population and in territorial suitability for private flying.

The shrinkage of the British aircraft industry from war to peace was estimated in 1943 by Sir Stafford Cripps, then minister of

aircraft production, as a fall to 10 p.c. of wartime workers remaining in the industry. Expansion in the operational side of public air transport and private flying, and rapidly growing opportunities for employment in both branches, are thus accompanied by a reduction on the industrial side.

Licences for Air Crews

All persons and aircraft operationally employed in civil aviation are registered and licensed by a government department, or a body appointed by the government. The issue of licences to all pilots and other operational members of air crew is subject to medical examination, and the production of a certificate of competency or the passing of appropriate examinations. Conditions governing the issue of a transport licence are much more stringent than those governing the issue of a private pilot's licence. Licences issued in civil aviation to air crews in the U.K. are: pilot—student, private, commercial, senior commercial, airline transport; flight navigator; radio operator; flight (aircraft, or operational) engineer. Licences are also issued to ground (maintenance) engineers: A, inspection of aircraft before flight; B, inspection of aircraft after overhaul; C, inspection of aero engines before flight; D, inspection of aero engines after overhaul; X, special duties.

The Royal Aero Club aviator's certificate is a certificate of competency in the pilotage of a heavier-than-air aircraft. It is issued by the club under the regulations of the Fédération Aéronautique Internationale, and is accepted by the ministry of Civil Aviation (*g.v.*) as a certificate for the issue of a pilot's licence.

Flying instructors in the U.K. must have their pilot's licences endorsed by the ministry of civil aviation. The Guild of Air Pilots and Air Navigators is the body appointed by the ministry to conduct the examination.

Certificates in respect of the registration of aircraft and their airworthiness are issued in the U.K. by the ministry of civil aviation or the air registration board, and in the U.S.A. by the civil aeronautics board.

There are six glider pilot's licences—A, B, C, Silver C, Gold C, and Diamond C, corresponding to stages of competence. Issued only after practical tests, they are in effect certificates of competency. They are issued by the Royal Aero Club in the U.K., and are interna-

tionally standardised under the Fédération Aéronautique Internationale. (See also under Glider.)

AVIATION (CIVIL) REGISTRATION MARKS. When civil aviation was resumed in Great Britain after the First Great War, on May 1, 1919, all aircraft bore standardised registration marks for the first time. Great Britain was thus a pioneer in this matter, anticipating the agreement of the international air navigation convention of July, 1919. Annex A of this convention became the basis of the law governing the marking of civil aircraft owned by states (or their nationals) who ratified the convention. In 1949 the regulations were redrafted.

Identity of civil aircraft is distinguishable by a nationality letter or letters, followed by a hyphen, which is in turn followed by a further group of letters indicating the national registration of the particular aircraft. Aircraft of countries that are members of the I.C.A.O. (International Civil Aviation Organization) use identification markings of groups of five letters, either single letter—hyphen—four letters, or two letters—hyphen—three letters. The following countries are exceptions: Russia (a non-signatory), USSR, printed СССР, and a number; U.S.A., which has different lettering for the several categories, using NX followed by a number (aircraft with experimental licence), NC followed by a number (aircraft with commercial certificate), or NR (restricted licence).

Situation of Marks

The national and registration marks making up the five letters are painted in Roman capital letters of uniform size and shape in black or a standard colour, on the lower surface of the lower main planes, and/or on the upper surface of the top main planes, the tops of the letters being towards the leading edge, and again along each side of the fuselage, or on the vertical tail unit. A gyroplane or helicopter carries the marking only on the fuselage or nacelle.

Combinations of three letters used in wireless abbreviations or codes were not allowed as registration letters. These include such combinations as SOS, PAN, TTT, RPT, and TXT, as well as all combinations beginning with Q, which would be confused with the Q code for aircraft W/T.

F-, G-, D-, I-, and J- are the identification letters for France

and French colonies and Protectorates (except Morocco), Great Britain, Germany, Italy and Japan respectively.

All remaining countries are identified by double letters, viz.:

AP-Pakistan	PI-Philippine
CC-China	Republic
CF-Canada	PJ-Neth. W. Indies
CL- or CM-Cuba	PK-Indonesia
CN-Morocco	PP-Brazil
CP-Bolivia	PZ-Surinam
CR-Portuguese	(Neth. Guiana)
Colonies	RV-Persia
CS-Portugal	SA-Saudi Arabia
CX-Uruguay	SE-Sweden
EC-Spain	SP-Poland
EL-Eire	SU-Egypt
HA-Hungary	SX-Greece
HB-Switzerland	TC-Turkey
HC-Ecuador	TF-Iceland
HH-Haiti	TI-Costa Rica
HT-Dominican	TP-Transjordan
Republic	VH-Australia
HK-Colombia	VT-India
HS-Siam	XA- or XB-
IG-Guatemala	Mexico
IN-Norway	XH-Honduras
LB-Lebanese	XT-China
Republic	XY-Burma
LY-Argentina	YA-Afghanistan
LX-Luxemburg	YI-Iraq
IZ-Bulgaria	YJ-New Hebrides
OB-Peru	YN-Nicaragua
OH-Finland	YR-Rumania
OK-Czechoslovakia	YU-Yugoslavia
OO-Belgium	YV-Venezuela
OY-Denmark	ZK-New Zealand
PH-Netherlands	ZP-Paraguay
	ZS-Union of South Africa

VP-, VQ-, VR-represent, with varying combinations of the three succeeding letters, Brit. colonies and protectorates.

Avicbron OR **SALOMON IBN (IBN) BIROL** (1020-69). Spanish-Jewish philosopher and poet, a native of Malaga, wrongly called an Arabian by the scholastics. His philosophy, which is contained in his *Fountain of Life or Wisdom*, combined Jewish views with Aristotelianism and neo-Platonism. He assumes that everything in the world, with the exception of God, consists of matter and form, dependent upon the divine will, a divine creative power emanating from God.

Avicenna OR **IBN SINA** (980-1037). An Arabian philosopher and physician. Born in the Persian province of Bokhara, he was minister to the prince of Hamadan, but was imprisoned as the result of political intrigue. Having escaped to Ispahan, he became court physician and lectured on medicine and philosophy. He died at Ispahan from overwork and riotous living. Avicenna wrote commentaries on Aristotle, whose works he was one of the first to introduce to the Eastern world. Matter, the principle of plurality, is eternal, and contains in itself all possibilities. It is not an emanation from the Deity. All individual things proceed indeed from God, but not directly; the first and only direct product of the Unchangeable (God) is intelligence.

Avicenna also wrote medical treatises, which were in general use in European universities and are still text-books in the East.

Avicennia. Genus of small trees of the family Verbenaceae. Natives of tropical sea-coasts and tidal rivers, they are known as white mangroves.

Avigliana. Village of N.W. Italy, Turin province. It is on the Dora Riparia and is 24 m. W. of Turin on the Mont Cenis route. It has a large dynamite factory.

Avignon. A city of France, capital of the dept. of Vaucluse. It stands on the left bank of the Rhône, 53 m. N.W. of Marseilles, and on the rly. from that city to Paris. It has several industries, chiefly in silk, and a trade in country produce, especially wheat, but is chiefly known for its historical associations and picturesque situation. It stands on a rock above the river, and several parks add much to its beauty.

Avignon is still surrounded by massive walls, built in the 14th century, and studded with towers and gateways, the whole being one of the most perfect examples of medieval fortifications extant. In the 12th century Romanesque

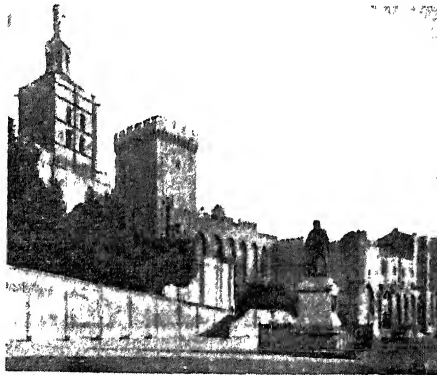
passed from one ruler to another and was for a short period an independent city. In 1309, when driven from Rome, Pope Clement V chose it as his residence, and here the popes lived for seventy years. Their palace, an enormous building not unlike a fortress, still survives; it has been used as a barracks and a prison. Pope Clement VI bought Avignon in 1348, and it remained papal property until its annexation to France in 1791. It was the first meeting-place of Petrarch and Laura. John Stuart Mill died here.

During the Second Great War Avignon came under the control of the Vichy government after the capitulation of France in 1940, remaining in unoccupied France until the occupation of the whole country by the Germans in Nov., 1942. Railyards were targets for Allied bombing attacks on May 27, 1944, and on July 17 bridges were bombed by U.S. heavy bombers. The town was liberated by French troops of the Allied 7th army on Aug. 25, 1944. Pop. 60,053. See Papacy.

Ávila. Prov. of central Spain. It is bounded S. and E. by the Sierra de Gredos and the Sierra de Guadarrama, and has an area of 3,042 sq. m. Flat and barren in the N., it is mountainous in the centre and S., and agriculture is confined to the fertile valleys of the Aberche, Adaja, and other rivers. Silver, lead, copper, and other minerals abound in the mountains, but are little worked. Livestock is reared, and the production of merino wool is one of the chief industries. Ávila is the capital. Pop. 241,508.

Ávila. City of Spain, capital of Ávila province. It stands on the Adaja, 54 m. by rly. N.W. of Madrid, on the route to Paris. Almost surrounded by mts. and encircled by well-preserved granite walls, with 9 gates and 86 towers, its buildings include a Gothic cathedral and Moorish castle. The ancient Abula, it flourished under the Moors, but declined after the expulsion of the Moriscos in 1610. There is a convent named after S. Teresa, who is supposed to have been born here. Pop. 15,223.

Avilés OR **SAN NICOLÁS DE AVILÉS**. A seaport of Spain, in Oviedo prov. The Roman Flavionavia, it stands on Avilés Bay, an arm of the Bay of Biscay.



Avignon. The fortress palace of the Popes and the 12th century Romanesque cathedral

cathedral of Notre Dame des Doms is the tomb of Pope John II, and outside a gilt statue of the Virgin. S. Pierre is a fine Gothic church. The hôtel de ville is modern, and the city has a fine library, a valuable museum, and a picture gallery. Part exists of its old bridge, made famous by the song *Sur le pont d'Avignon*.

Avignon, the ancient Avenio, was a town of the Gauls, and later became an important Roman settlement. Its bishopric was founded in the 3rd century, and it became the seat of an archbishop in 1475. In the Middle Ages it

24 m. by rly. W. of Gijón. It is a fishing and coasting port, exports coal, and manufactures woollens, linen, and glass. Pop. 15,000.

Avion. Town of France, in the department of Pas-de-Calais. It is a great rly. junction, 1 m. S. of Lens, and was captured by the British in the battle of Lens, June 29, 1917.

Avitus, MARCUS MAECILIUS (d. A.D. 456). West Roman emperor. While holding a military command he was sent by the Roman general Aëtius to Theodoric the Visigoth, whom he persuaded to join the Romans against the Huns. He fought by the side of Aëtius at the Catalaunian Plains in 451, and in 455 was proclaimed emperor. In 456, defeated by Ricimer at Placentia (Piacenza) he was deposed.

Avoca or **OVACA.** River of co. Wicklow, Eire. Formed by the union of the Avonmore and Avonbeg, it flows 9 m. S.E. to the Irish Sea at Arklow. It traverses a beautiful glen, the "sweet vale" of Moore's poem. A rly. and lead and copper mines detract from its beauty. The district is the richest mining area in Eire.

Avocet (*Recurvirostra avosella*). Bird related to the snipe, characterised by its long upward-curved beak. Formerly common in the fen districts of England, it is now rare.

Avogadro's Law. (Chemical law named after its discoverer, the Italian chemist and physicist, Count Amadeo Avogadro (1776-1856). A gas is supposed to consist of molecules all of which are moving in paths, the movement being considered as a motion of translation, and these molecules continually collide with one another. On account of these collisions, the velocities of each and every molecule differ from time to time; and for convenience it is usual to speak of the mean or average velocity of the molecules, and to assume that they all move with the mean of their actual velocities. In the same way the length of the path traversed by each molecule between successive collisions varies, but there is a mean free path, and it is assumed that this mean free path will be the same for any large number of molecules, if the conditions of temperature and pressure are the same.

The pressure exerted by a gas against the sides of a vessel containing it is due to the movements of its molecules. Now, according to Boyle's Law, the volume of a gas multiplied by its pressure is always the same, and from this it is deduced that in a gas the mean velocity of

the molecules is also constant. If two gases are under the same pressure and at the same temperature, the mean value of the energy developed by the collisions of their molecules must be the same. Hence it can be deduced that the number (though not the size) of their molecules is the same. This leads to what is called Avogadro's Law: that under the same conditions of pressure and temperature equal volumes of all gases contain an equal number of molecules. See Boyle's Law.

Avoidance (Lat. *viduus*, widowed, bereft). Term used in ecclesiastical law for a benefice without an incumbent and so void or empty.

Avirdupois. The English and American system of weighing all substances except precious metals and stones, and medicines. It comes from the old French *avoir de poids*, more correctly *avoir de poais*, goods of weight. The basis is the grain, originally a wheat corn taken "from the midst of the ear": 7,000 grains making 1 lb. . 27½ grains one dram. 16 drams one ounce: 16 oz. 1 lb. . 112 lb. one hundredweight: 20 cwt. one ton. See Weights and Measures.

Avola. Town of Sicily, in Syracuse prov. It is 22 m. by rly. S.W. of Syracuse, and occupies the site of a former town destroyed by earthquake in 1693. Almond trees and sugar-canes flourish, their produce, with wine and straw-matting being exported. Pop. 16,500.

Avon (Welsh *afon*, river). Name of several rivers in England and Scotland. The word is akin to the Latin *aqua* (water) and *amnis* (river), both from the same Sanskrit root *ap*=water.

Avon, EAST. River of Wiltshire, England. Rising near Devizes, it flows S. past Salisbury to the English Channel at Christchurch. It is about 50 m. long and is navigable to Salisbury.

Avon, LOWER. River of England, known also as the Bristol Avon. Rising on the Cotswold Hills, in Gloucestershire, it flows through Wiltshire and Somerset past Malmesbury, Chippenham, Bath, and Bristol, to the Severn estuary at Avonmouth. It is

75 m. long, and is navigable as far as Bath by small and as far as Bristol by large vessels.



Avon. Reaches of the Upper Avon at Bidford, Warwickshire, between Stratford-on-Avon and Evesham

Avon, UPPER. River of England, known also as the Warwickshire Avon. Rising near Naseby, in Northamptonshire, it flows through Leicestershire, Warwickshire, Worcestershire, and Gloucestershire, to the Severn at Tewkesbury. It is 96 m. long and is navigable to Evesham. It is noted for its prospect of Warwick Castle and for Stratford, the birthplace of Shakespeare, the "Sweet Swan of Avon."

Avon. River of Banffshire, Scotland. Rising in Loch A'an, it flows 30 m. N. to the Spey near Ballindalloch.

Avon. River of Lanarkshire, Scotland. It rises at the foot of Waddell Hill, flows 29 m. N.E., past Stonehouse, to join the Clyde near Hamilton.

Avonmouth. Seaport of Gloucestershire, England. It stands at the mouth of the Lower Avon, 6 m. N.W. of Bristol, on two rly. lines. Dating from 1877, it is the outport of Bristol and forms part of that city. See Bristol, Port of.

Avory, SIR

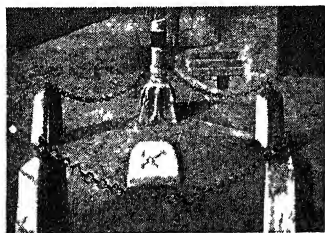
HORACE EDMUND (1851-1935). British judge. Born Aug. 31, 1851, he was educated at King's College, London, and Corpus Christi College, Cambridge. Called to the bar in 1875, he became junior counsel to the Treasury at the Old Bailey in 1889 and K.C. 1901. A judge of the King's Bench Division from 1910, when he was knighted, he was associated with great criminal



Sir Horace Avory. British judge

trials, either on the bench or as member of the court of criminal appeal, until his death, June 13, 1935. Outstanding among his trials were those of Casement for high treason, 1916; Mahon and Vaquier, both for murder, 1924; Browne and Kennedy for the murder of P.C. Gutteridge, 1927; and Hatry for fraud, 1930. *Consult* Lives, S. Jackson, 1935. G. Lang, 1935.

Avranches. Town of France, in the department of Manche. On the river Sée, 87 m. by rly. S. of



Avranches, France. Spot where Henry II of England promised expiation for the murder of Thomas Becket

Cherbourg, it is on the coast road from St. Malo to Granville. Formerly an important place in Normandy, it had a magnificent cathedral wherein Henry II was absolved of all complicity in the murder of Thomas Becket and promised expiation, withdrawing, at the same time, all his demands on the church (Concordat of Avranches, 1172). An inscribed stone in the open square marks the spot where he knelt.

The cathedral was destroyed in the Revolution and the bishopric was abolished. The town stands on a hill overlooking Mont St. Michel, has three modern churches, a town hall, and botanic gardens. It has leather, brewing, and dyeing industries, and trades in agricultural produce, flowers, and fish. Dating from Roman times, it underwent several sieges and suffered in the peasant revolt of 1639. After the Franco-German armistice in June, 1940, Avranches became part of German-occupied France. Heavily damaged during the fighting on the Normandy front in 1944, it was liberated by U.S. forces on July 31, this enabling the Allies to thrust swiftly S. towards Brittany.

Avro. Aircraft designed by the firm of A. V. Roe & Co., Ltd. This was founded by the pioneer A. V. Roe, now Sir Alliott Verdon-Roe (*q.v.*), in 1910, and for much of the First Great War and thereafter concentrated on the type 504, a standard biplane trainer turned out in huge numbers. In the

Second Great War, Avro produced the twin-engined Anson reconnaissance and training plane, the Manchester, Lancaster (*q.v.*) and Lincoln bombers, and the similar Lancastrian and York transports etc. In 1945 appeared the first Tudor for the air lines, and in 1946 the first experimental jet airliner (the Nene-Lancastrian).

Awaji or **AVANISI.** Island of Japan. At the E. end of the Inland Sea, between Honshu and Shikoku, it is 33 m. long, 16 m. broad, and 229 sq. m. in area. Very fertile and low, it has a dense population and many ferry and steamer services with the main island. It is a favourite tourist resort, and manufactures pottery.

Award (Old Fr. *esgarder*, to adjudge). In English law, the finding or decision of an arbitrator or arbitrators, corresponding to the judgement of a court of law. The award, which must be made within time fixed by the agreement, states the decision of the arbitrator or arbitrators by whom it is signed. It must be stamped, the cost varying from threepence to 10s. Unless the award has been improperly procured, or the arbitrator has misconducted himself or the proceedings, its validity will be recognized and, if necessary, supported by the courts of law. *See* Arbitration.

Awe. A river of Argyllshire, Scotland, draining Loch Awe into Loch Etive. Traversing the deep gorge of the picturesque Pass of Brander, it is noted for its salmon and sea-trout. It is 5 m. long.

Awe. Lake or loch of Argyllshire, Scotland. The longest freshwater lake in the country, it extends N.N.E. for 22½ m. from Ford to the foot of Ben Cruachan, is from ½ m. to 3 m. broad, and covers an area of 15½ sq. m. It has very diversified scenery and contains many islands, including Fraoch-Eilean, with remains of castle (1267), and Inishail, with ruined convent and church. The ruins of Kilchurn Castle, a Macdonald stronghold stand on an island at its N.E. end.

Axbridge. Town of Somerset, England Between the river Axe and the Mendip hills, it is 8 m. S.E. of Weston-super-Mare and has a station on

the rly. Built round a square, it has stocks and a bull-baiting post. The church has some fine ornamental roofs, one having been executed in 1636 by a native, and several memorials to the Prowse family. Pop 1,017.

Axe (Gr. *arinē*). Implement used for felling timber or cutting wood. It is a hand tool with a head, usually of iron, and having a hardened steel cutting edge. In the process of manufacture, an eye is punched in the solid metal of the head for the reception of a helve or shaft cut from hickory, ash, or other resilient wood. The cutting edge, commonly secured to the head by welding, is set in the plane of swing of the shaft, thus distinguishing it from the adze, in which the cutting edge is at right angles to the plane of swing. Bronze axes were used in England, and also by the Egyptians, who split the handles to receive blades secured by pins and leather thongs.

Axe. Name of two rivers of England. One, 25 m. long, rises in the Mendip Hills, Somersetshire, and flows past Cheddar and Axbridge to the Bristol Channel at Uphill, near Weston-super-Mare. The other, 21 m. long, rises in Dorset and flows S. past Axminster to the English Channel near Seaton.

Axel Heiberg. An island of Canada. In the Arctic region, it lies W. of Ellesmere Island in lat. 78 to 81 N., long. 88 to 92 W.

Axenstrasse. Road in Switzerland, the part of the St. Gotthard carriage road which is carved out



Awe. View of the north-eastern end of the Argyllshire loch, with the ruins of Kilchurn

of, or tunnelled through, the rocky cliffs on the Bay of Uri, Lake of Lucerne. The road was made in 1822-30 except for this portion, which was not opened until 1866.

Axholme, ISLE OF. Level tract of land in Lincolnshire, England. Between the Trent, Idle, Torne, and Don rivers, it was formerly afforested and later became a marshy swamp, which was drained (1625-34) at the command of Charles I by Cornelius Vermuyden, a Dutchman. It covers 48,000 acres and is of great fertility.

Axil. Botanical term for the angle formed above a leaf where it joins the stem.

Axi'la (Latin). Space between the upper part of the side of the chest and the upper part of the arm, more commonly known as the armpit. It is bounded in front by the pectoral muscles, which pass from the front of the chest to the arm, and behind by muscles attached to the shoulder blade and by the tendon of the *latissimus dorsi*, the great muscle running up from the back. The outer wall of the *axilla* is formed by the *humerus* or upper arm bone and a tendon of the biceps muscle, and the inner wall by the upper four or five ribs with the muscles between them.

Axim. Town of the Gold Coast Colony, British W. Africa. It lies E. of the mouth of the Ankobra river, 70 m. W. of Cape Coast, has a good harbour, and exports timber. Built by the Portuguese, it was taken by the Dutch in 1642 and ceded to the U.K. in 1872.

Axiom (Gr. *axioma*, something thought worthy). Self-evident proposition which may be used as the basis of proof for other propositions. Such are the laws of identity and contradiction in logic. In a narrower sense axioms are principles which depend upon direct intuition, such as those of mathematics and physics. The word is also used for a condensed, instructive saying, or aphorism.

Axis (Lat., axle). In geometry, any line in a figure which divides



Axis Deer. Indian species (*Axis axis*), somewhat like the fallow deer

the figure into two symmetrical parts. In analytical geometry, an axis of reference is either of two intersecting straight lines by reference to which the position of any point in a curve is determined.

In conic sections, the axes of the curves have a specific meaning. For example, the axis of a hyperbola bisects the curve at its origin and, passing through both branches of the curve, extends to infinity in either direction; the axis of a parabola stretches to infinity in one direction; but the ellipse has two axes, a major and a minor axis, symmetrical as to the curve and bounded by it. See Geometry.

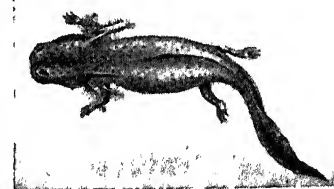
Axis, BERLIN-ROME. Political collaboration of Nazi Germany and fascist Italy, inaugurated 1935-36. At this time Italy was angered at the imposition of economic "sanctions" by the League of Nations because of her aggression upon Abyssinia; while Germany was reoccupying the Rhineland in defiance of the Versailles treaty. The collaboration developed into a full political and military treaty of alliance signed May 22, 1939. It was then stated that Germany and Italy "join forces for securing their living space and maintaining peace, so as to make the foundations of European civilization safe amid a world of unrest and disintegration." The treaty was valid for 10 years. On Sept. 27, 1940, Japan joined the Axis by signing the Berlin pact (*q.v.*) whereby she promised to assist the two European powers to set up a new order in Europe while they in turn undertook to assist her in the establishment of a new order in Greater Asia. Hungary signed her adherence to the Axis on Nov. 20, 1940, Rumania and Slovakia on Nov. 23, Bulgaria on March 1, 1941. Yugoslavia on March 29 (which led to revolt), and Croatia on June 14, 1941.

Axis Deer. Species of Indian deer, somewhat resembling fallow deer, but with short sharp antlers. Its fawn-coloured coat is abundantly spotted with white. This species is easily domesticated.

Axle. Shaft or spindle on which or with which a wheel revolves. Properly the term is applied only to axles of vehicles, the name shaft or spindle being used for the corresponding members in other wheels. In carts, etc., the wheels are carried upon and kept at the proper distance by an axle-tree, and the cylindrical ends of the axle-tree are then termed the axle. A live axle, in motor vehicles and the like, is one driven by the engine. The wheel-and-axle is one of the mechanical powers. See Wheel.

Axminster. Parish and market town of Devon, England. On the Axe, 27 m. E. of Exeter, with a rly. station, it was famed for its carpets until 1835, and now makes tooth and nail brushes and has flour, corn, and saw mills and an iron foundry. The church of S. Mary the Virgin was restored in 1871. Axminster's midsummer fair dates from 1246. Market day, alternate Thurs. Pop. 2,327.

Axolotl. Larval form of *Amblystoma*, a kind of salamander common in Mexico. In appearance it usually resembles a large black newt with external branching gills. It lays eggs freely, even

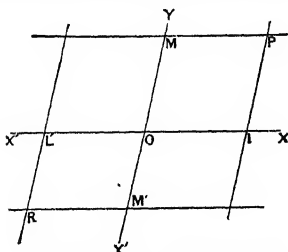


Axolotl. *Gyrinus* *edulis*, the larva form of a Mexican salamander

in captivity, and was long supposed to be a mature animal of the newt tribe; but it is now known that, if deprived of water, or treated with extract of thyroid gland, it loses its gills and changes into the typical salamander known as *Amblystoma*.

Axum or **AKSUM**. Ruined town of Abyssinia, in the prov. of Tigré. It was once the capital of an Ethiopian kingdom and contains monoliths, apparently associated with Semitic sun-worship, and ruins of a Christian church. Pop. 5,000. Consult The Sacred City of the Ethiopians. J. T. Bent, 1893.

Ayacuchio. Department of S. Peru. A mountainous and somewhat barren region of 18,185 sq. m. it is watered by the Apurimac and



axes of reference XOX' and YOY' , by which the positions of P and R are determined. See text

its affluents. Silver and other minerals are worked, sheep and cattle are reared, and coffee, cocoa, cotton, and grain produced. Capital, Ayacucho. Pop. 358,991.

Ayacucho. City of Peru, capital of the department of Ayacucho. It stands on a plateau, at an altitude of 9,000 ft., 145 m. W.N.W. of Cuzco. It is the seat of a bishopric, has a cathedral and a university (founded 1677), and trades in cochineal. Founded by Pizarro in 1539 as San Juan de la Victoria, its present name, meaning the corner of death, was adopted after Peru gained its independence. Dec. 9, 1824. Pop. 20,000.

Ayah. A word of Portuguese origin meaning a nurse or governess, feminine of *aio*, a tutor. By the Portuguese it was introduced into India, where it is used for a native nurse or lady's maid.

Ayala, PEDRO LOPEZ DE (1322-1407). Spanish writer and statesman. He held several high offices in Castile, becoming grand chancellor in 1398. He was taken prisoner at Najera in 1367 by the Black Prince, and at Aljubarrota in 1385. His reputation rests on his chronicles of the Castilian kings.

Ayamonte. Frontier town and harbour of Spain, in Huelva prov. On the Guadiana, 2 m. from its entrance into the gulf of Cadiz, and 80 m. W.S.W. of Seville, it has a good harbour, sardine and tunny fisheries, and makes silk.

Aycliffe. Proposed new town of co. Durham, England. See N.V.

Aye-Aye. Native name of *Cheiromys madagascariensis*, an animal allied to the lemurs found only in Madagascar. A highly aberrant member of the Primates, its teeth resemble those of the rodents. It is about the size of a cat with a very bushy tail and prominent, almost hairless ears. Its hands are very like those of monkeys, except that the third finger is curiously long, slender and withered.

looking, and is believed to be used for extracting insects from crevices. Nocturnal in its habits, little is known of it. Probably it lives mainly on grubs, but the fondness of captive specimens for sugar-cane suggests that it also feeds on fruits and succulent vegetables. The first specimens were brought to England in 1860

Ayesha. The favourite wife of Mahomet, the prophet of Islam. Born at Medina about A.D. 611, the daughter of Abu-Bekr, she married Mahomet when nine years old and obtained great influence over him. On his death in 632 she opposed the claim to the succession of Ali, husband of the prophet's daughter, in favour of her own father, who became the first caliph. She died at Medina about 678. Though childless, she was honoured with the title of 'mother of the believers.' Ayesha is also the name of the immortal woman in Rider Haggard's romances *She* and *Ayesha*. See Mahomet.

Aylesbury. Mun. bor., market town, and county town of Buckinghamshire, England. Occupying an



Aylesbury arms

an elevated site in the Vale of Aylesbury, it is 38 m. W.N.W. from London by steam and elec. rly. and Green Line. Industries include book-binding, engineering, manufacture of velour hats, felt processing, cheese

making, and butter blending. The Early English church of S. Mary, county hall, and 15th century King's Head hotel with a splendid window, are among the chief buildings. Market days, Wed. and Sat. Pop. 18,072

Aylesbury was wrested from the Britons by the Saxons in 571. A charter was granted by Queen Mary in 1554, but the rights and privileges were not enjoyed for long, and only in 1917 was the charter restored.



Aylesbury, Buckinghamshire. Market place and clock tower of the old county town

Although Aylesbury returned two members to Parliament down to 1885, it now gives its name to a county division with one member. In the vicinity is Hartwell House, where Louis XVIII resided during his exile (1810-14).

Aylesbury Duck. Large white duck, deriving its name from the district in which it is mainly bred. It is known all over the world for its superior table qualities. Specimens are frequently produced weighing from 4 lb. to 5 lb. when only eight weeks old. Its distinguishing features are its weight, varying from 6 lb. to 10 lb., its pure white plumage, flesh-coloured beak and bright orange shanks and feet. The tail of the drake has characteristic curled feathers.

Aylesford. Parish and village of Kent, England, on the Medway, 38 m. S.E. of London, with a rly. station. Here are Kit's Coty House, a cromlech of three perpendicular stones and a covering stone, and a larger group close by the Countess Stones. There are remains of a 13th century Carmelite friary, and at Horsted is the supposed tomb of Horsa, slain in



Aylesford Kent, showing portion of the beautiful old bridge across the Medway

battle with the British king Vortigern in 455. Pop. 3,644. See N.V.

Aylesford, EARL OF. British title borne since 1714 by the family of Finch. Heneage Finch, a younger son of the 1st earl of Nottingham, was the first holder. He was solicitor-general under Charles II. and lived until 1719. In 1688 he was leading counsel for the seven bishops. In 1885 Charles Wightwick Finch (1851-1924) succeeded as 8th earl; he was the first who did not bear the Christian name of Heneage. The 10th earl (b. 1886) succeeded his nephew in 1941. The family estates are in Warwickshire and Kent, the earl's eldest son is known by the name of Lord Guernsey.

Aylmer, BARON. An Irish title borne by the family of Aylmer

since 1718. Its first holder, Matthew Aylmer, was an M.P. and an admiral, being commander of the fleet in 1709. He was made an Irish peer in 1718, and died in 1720. Matthew, the 5th baron, a general, was governor-general of Canada in 1830. The 7th and 8th barons made their homes in Canada. The 9th baron (b. 1880) succeeded his father in 1923.

Aylmer, FELIX (b. 1889). British actor. Born at Corsham, Wilts. Feb. 21, 1889, he went to Exeter College, Oxford, and first appeared on the stage in 1911.

Later he joined the Birmingham repertory company. In 1923 he took the title part in Robert E. Lee at the Regent Theatre, London. In *Yes and No*, 1937, and *Scandal at Barchester*, 1944, he had the principal part, each time as a clergyman. From 1936 he was seen in countless British films and became almost an automatic choice for any supporting character such as a bishop, cabinet minister, or magistrate. He was a regular broadcaster of poetry. He married the actress Cecily Byrne.

Aylmer, JOHN (1521-94). English prelate. Born in Norfolk, of an old county family, he graduated at Cambridge in 1541, and became chaplain to the duke of Suffolk and tutor to Lady Jane Grey. Made archdeacon of Stow in 1553, he declared in Convocation against the doctrine of transubstantiation, and on sentence of deprivation retired to Strasbourg and Zurich, returning on the accession of Elizabeth. His archdeaconry was restored to him, 1559. Archdeacon of Lincoln, 1562-76, he was made bishop of London in 1577. His episcopate was distinguished for its severity against Catholics and Puritans. He died June 3, 1594.

Aymara. A South American Indian people in Bolivia and S. Peru. Their proper name is Colla; the other was incorrectly transferred to them from a Quichua-speaking tribe who were settled among them by the Incas and acquired the Colla language. This pre-Incan people apparently came under immigrant influences which introduced megalithic building and advanced industrial arts.

The Aymara remains include rock-cut seats, colossal statuary, stone cists, sometimes two-storeyed,

cylindrical towers or *chullpas* up to 40 ft. high, dolmens, and massive sepulchral chambers erected against cliff-sides. At Tiahuanaco, S. of Lake Titicaca, stands a pyramidal mound 83 ft. high, with remains of a cyclopean palace, monolithic stairway, five rows of menhirs, and a portal formed out of an andesite block 10 ft. high and 13½ ft. wide, which bears in relief the hero Viracocha and convergent rows of winged warriors and condors. The Colla physical type, established by long residence at high altitudes—lighter-tinted, sturdier than the Quichua—still dominates the indigenous Bolivian population, and cultural survivals lurk under their nominal Christianity. See American Indians.

Aynesworth, ALLAN (b. 1865). British actor. Born at Royal Military College, Sandhurst, April 14, 1865, the son of General Abbot Anderson, he was educated in France and Germany. His first appearance was at the Comedy Theatre in 1887, after which he played in London until 1912, when he entered on the management of the New Theatre with Ready Money. He subsequently managed several London theatres, appearing in popular plays, such as *The Circle*, 1921; *The Dover Road*, 1922; *Counsel's Opinion*, 1931; *Living Dangerously*, 1934; *Tovarich*, 1935; *Victoria Regina*, 1937.

Ayr. Mun., parl., police, and royal burgh, seaport, and county town of Ayrshire, Scotland. It stands at the mouth of the river Ayr, 31 m. S.S.W. of Glasgow by the railway. Five bridges cross the river; the Auld Brig (15th century) and the New Brig (1788, rebuilt 1879) are the celebrated "twa brigs" of Robert Burns.

Ayr has an academy, founded in 1764 and rebuilt in 1880, a Carnegie library (1893), a fine town hall, and a Burns and other statues. The Wallace Tower, 115 ft. high, was erected in 1834 on the site of a former building of that name. The church of S. John, where Bruce's parliament was held in 1315, was rebuilt in 1655, and retains part of its old tower. The town and castle were closely associated with the war for Scottish independence and with the exploit of Sir William Wallace, who razed the barns of Ayr, temporary barracks erected for the troops of Edward I.

There are commodious docks and harbour, carpet, lace, and woollen manufactures, chemical and engineering works, iron foundries and shipyards. Coal is exported and metals and ores are imported. Shipping trade is mainly with Ireland. Market day, Tues. One member is returned to Parliament. Four race meetings are held yearly. During the Second Great War important aerodromes were established nearby. Pop. 41,600.

Ayres, RUBY MILDRED (b. 1883). English novelist. As a child she wrote fairy stories and later contributed serials to newspapers and magazines, most of which were published in book form. She also wrote for the films both in England and in America. Her books, chiefly light romantic fiction, include *Richard Chatterton, V.C.*, *Castles in Spain*, *Silver Wedding* (produced as a play, 1932), and *Still Waters*.

Ayrshire. South-west maritime county of Scotland. It is popularly divided into three ancient districts, Cunningham, Kyle, and Carrick, and has a greatest length of 78 m., extreme breadth of 29 m., 70 m. of coast, and an area of 1,132 sq. m. Off the coast is Ailsa Craig (*q.v.*). The surface, mainly undulating, is mountainous S. and S.E., the highest summit being Black Craig, 2,298 ft.

Rugged in the S., the coast is low and unrelieved above Ayr, and quite destitute of natural harbours. Loch Doon is the largest lake, and the Garnock, Ayr, Irvine, Doon, Girvan, and Stinchar, all unnavigable but picturesque, are the chief rivers. Agriculture is progressively important, Ayrshire being noted for its breed of cows and for its dairy-farming. Cheddar cheese, produced in large quantities, has supplanted the once celebrated Dunlop cheese. Coal, iron, limestone, and sandstone are worked, and numerous blast furnaces and the manufacture of woollens, cottons, earthenware, and ironware give it industrial importance. The co. is well served by railways. Ayr is the county town, and other towns are Kilmarnock, Irvine, Saltcoats, Troon, Ardrossan, Prestwick and Girvan.

Ayrshire unites with Bute to return three members to Parliament.



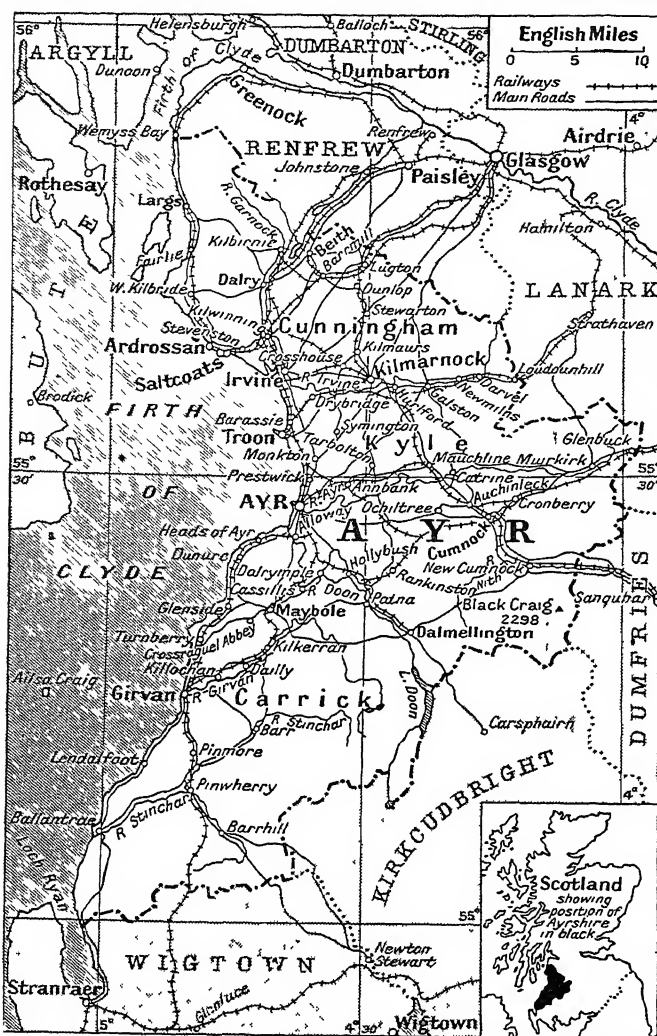
Felix Aylmer,
British actor



Ruby M. Ayres,
English novelist



Ayr burgh arms



Ayrshire. Map of this S.W. county of Scotland. It stretches along the Firth of Clyde, and is an important industrial and agricultural area

Pop. est. 298,700. Antiquities include ruins of Crossraguel and Kilwinning abbeys and of castles at Turnberry and Dunure.

LITERARY ASSOCIATIONS. The county is rich in literary associations. Two early Scottish poets belonged to Ayrshire, Walter Kennedy of the 15th century, and Alexander Montgomerie of the 16th. But in poetry the pre-eminent position belongs to Robert Burns, who was born at Alloway, where a museum and monument commemorate him. James Montgomery, who sang of The Common Lot, was born at Irvine, as also was John Galt, author of *The Annals of the Parish*. James Boswell, the biographer of Johnson, was one of the Boswells of Auchin-

leck. Ochiltree was the birthplace of George Douglas, and scene of his best-known story *The House with the Green Shutters*.

Ayrton, WILLIAM EDWARD (1847-1908). British scientist. He was educated at University College, London, devoted himself to the study of electrical physics, and spent some years in the public service of India and teaching in Japan. In 1879 he became professor of applied physics at the City and Guilds of London Technical Institute, Finsbury, and in 1884 professor of electrical engineering at the Central Technical college, South Kensington, where he made a great reputation as an electrician. He died in London, Nov. 8, 1908. In 1885 Ayrton

married Hertha Marks (1854-1923), who assisted him greatly in his experimental work. Her special subject of research was the electric arc, and she invented an anti-gas fan which was used by British troops in 1916.

Ayr Water. River of Ayrshire, Scotland. Flowing in a W. direction for 38 m., and finally falling into the Firth of Clyde at Ayr, it divides the county into two almost equal parts.

Ayscough, JOHN (1858-1928). Pen-name of Monsignor Francis Browning Drew Bickerstaffe-Drew, British novelist and priest.



John Ayscough, British novelist Russell

Educated at Lichfield, Denstone, and Oxford university, he was received into the Roman Catholic church, 1878, and ordained priest in 1884. In 1886 he became a chaplain to the British forces, and served with them in the First Great War. He received numerous honours from three popes, and was created monsignor in 1904. His literary work consists mainly of novels, of which Marotz, 1908, San Celestino, 1909, and Gracchus, 1913, are most notable. He died July 3, 1928.

Aytoun or Aytoun, SIR ROBERT (1570-1638). Scottish poet. Born at Kinaldie, Fife, he was educated at St. Andrews and at Paris. The double recommendation of being a Scot and of having addressed a Latin panegyric to James on his accession to the English throne, secured him the royal favour, and he became in succession a gentleman of the bedchamber, private secretary to the queen, and ambassador to the German princes, and was knighted in 1612. He was one of the first Scots to write pure and graceful English. His principal English poem, however, *Diaphantus and Charidora*, like his Latin poems, is poor. He succeeds best in love poems, such as *Inconstancy Upbraided*. He died in Feb., 1638, and was buried in Westminster Abbey.

Aytoun, WILLIAM EDMOND-STOUNE (1813-65). Scottish poet. Born in Edinburgh, June 21, 1813, the son of a lawyer, he was educated at Edinburgh academy and university. He published his first volume of verse in 1830. After studying in London and Germany, he became a lawyer, but devoted much time to literature. He did

many translations from the German, but the Bon Gaultier Ballads, in which he cooperated with Sir Theodore Martin, are better known. Nearly as popular were his own Lays of the Scottish Cavaliers. His drama Firmilian may be mentioned, also his Bothwell, and his collection, Ballads of Scotland. In 1845 he was made professor of rhetoric at Edinburgh, and in 1852 sheriff of Orkney. He died Aug. 4, 1865.

Ayub Khan (1855-1914). An Afghan prince. He was the younger son of Shere Ali, ameer of Afghanistan, and was governor of Herat. In 1879 he claimed the sovereignty of Afghanistan, and gained a victory over Gen. Burrows at Maiwand July 27, 1880, but was utterly defeated Sept. 20 at Kandahar by Sir Frederick (later Earl) Roberts after his famous march from Kabul. In 1881 Ayub captured Kandahar, but he was driven out by the ameer Abd-ur-Rahman and forced to flee to Persia. Later he surrendered to the British.

Ayvalik. Seaport on the W. coast of Asiatic Turkey. On the Gulf of Adramyti, 66 m. N.N.W. of Izmir, it stands near the ancient Heracleia Pontica. Its exports include olive oil, soap, cereals, wood, and skins. The name means quince country. Pop. 17,000.

Azad, ABDUL KALAM. Indian politician. He spent his youth in Arabia and Egypt, and was educated at Al Azhar university Cairo. In 1914 he joined Gandhi's National Indian congress and took a leading part in Khilafat non-cooperation, and civil disobedience movements, and was imprisoned several times, 1921-32. He was Congress president 1940-46. He founded Al-Hila (Urdu Weekly) which was suppressed by the British government.

Azalea (Gr. *azaleos*, dry). Genus of shrubs of the large family Ericaceae. Natives of America and Asia, they have alternate oval or elliptical leaves, and large showy funnel- or bell-shaped flowers in umbels. Most of the garden and greenhouse plants are hybrids, ranged in two classes: American or Ghent azaleas, and Indian or Chinese azaleas. They are supposed to grow best in dry soil.

Azamgarh. Municipality and division of India, in the Gorakhpur district of the Agra Province, United Provinces. The district is part of "the plains" bounded on the N. by the river Gogra, and is traversed by the Tons river, on

which is the municipality, 55 m. N. of Benares by rly. The municipality was founded by Azam Khan in 1665, and was a centre of disaffection during the Mutiny, 1857. The people are mostly Hindus.

Azān OR **ADHĀN** (Arab., call to prayer). Term for the Mahomedan summons to prayer at the five appointed hours. The call is chanted by a crier (*mu'azzin* or *mu'adhdhin*) from the minaret of a mosque.

Azaña, MANUEL (1880-1940). Spanish politician. Born at Alcalá de Henares, he became a barrister and lectured at Madrid university. The author of many political works, dramas, and novels, he specialised in military affairs and was active in the revolutionary movement 1930-31. Minister for War in the first Republican government, Azaña was president from Oct., 1931, until Sept., 1933. Charged with implication in the Catalan uprising of Oct., 1934, he was arrested and imprisoned. He succeeded Zamora as president for the second time on May 10, 1936. He fought throughout the Spanish civil war (*q.v.*) and went to France at the collapse of the republic. On Feb. 23, 1939, Azaña resigned his presidency, being opposed to the policy of continued resistance to Gen. Franco. He died at Montauban, France, Nov. 4, 1940.

Azazel. Hebrew word occurring in Lev. 16, 8, 10, 26, rendered scapegoat (*q.v.*) in the A.V. but ex-

posed, shrivelled, they are a degraded Arab tribe living in tents and pasturing their flocks on the scanty vegetation of upland wadies.

Azeglio, MASSIMO TAPARELLI, MARQUIS D' (1798-1866). Italian statesman and author. Born at Turin of an old noble Piedmontese family, he first became known as a landscape painter in Rome. After publishing two political novels he went round the country preaching patriotism and a national policy. In 1848 he fought in the campaign against Austria, and was wounded at Vicenza. In 1849 he was appointed prime minister by Victor Emmanuel II and in 1852 resigned, recommending Cavour for the post.

Azerbaijan. One of the Soviet Socialist Republics. Bounded N. by the R.S.F.S.R. and Georgia, W. by Armenia, S. by Persia, E. by the Caspian Sea, it includes the Nakhichevan A.S.S.R. and the Nagorno Karabakh autonomous prov., and has an area of 33,460 sq. m. The pop. in 1939 was 3,209,700; the capital is Baku. Azerbaijan was proclaimed independent by the constituent assembly of the Tartars, 1918, became a republic, 1920, formed with Georgia and Armenia the Transcaucasian S.F.S.R. until 1936, then achieved separate status and a constitution.

The country is mountainous with magnificent scenery, but, lying largely on the S. slopes of the Caucasus, has a comparatively kindly climate in which agriculture thrives. Grain, cotton, fruit, vines, and tobacco are grown. Caviare is a product of the Caspian fisheries. Chief industry is the production and refining of petroleum, the centre of both processes being Baku. Wells lie N., S., and W. of that city, and some have been sunk in the sea off Apsheron peninsula. Copper, zinc, and manganese occur. Baku is the terminus of rlys. to Azov, Georgia, Armenia, and Turkey, and of airway and shipping lines to Krasnovodsk in the Turkmen S.S.R. The Azerbaijan Academy of Science was inaugurated at Baku March, 1945.

Azerbaijan. Independent prov. of Persia. Anciently known as Atropatēnē, it is bounded N. by Russia, W. by Turkey and Iraq, S. by Kurdistan prov., and E. by Khamsēh and Gilan provs. A mountainous country, its chief natural features are the volcanic Savian or Sawalan Dagh, 15,814 ft. high, and the saline Lake Urmia, 85 m. by 30 m. There is a scanty rainfall, but the streams are



Azalea. Bloom and leaves of this fragrant flowering shrub

plained as the name of an evil spirit in the R.V. Milton in Paradise Lost makes Azazel one of the fallen angels and standard-bearer to Satan. According to the Mahomedans Azazel was chief of the geni who were imprisoned by the angels and refused to do homage to Adam.

Azazima plural of Azzami). Beduin tribe on the Gobei Magrath plateau, midway between Gaza and Akaba, S. Palestine. Small.

perennial, being fed by the melting snows, the land is therefore parched, except near the rivers and the numerous springs. Lead, iron, copper, and other minerals are found, wool is spun, and the valleys produce wheat, rice, barley, maize, flax, and hemp, while camels, horses and cattle are raised. The pop., some 2,000,000 consists of Turkomans, Kurds, Persians, and Armenians. A dialect of Turkish is spoken, and a large number of the people are Turkish in their sympathies, a fact which led to the occupation of part of the prov. by the Turks before the First Great War. Tabriz is the capital. For the rebellion which broke out in Nov., 1945, and the subsequent disputes, see Persia.

Azides. Salts of azoimide (hydrazoic acid), also known as trinitrides. Azoimide has been given the formula N_3H and possesses similar properties to hydrochloric acid, but is only of about the same strength as acetic acid. It forms compounds with most metals and alkalis and some organic radicals, the majority of which are violently explosive. Lead azide is the most important salt and has been used in place of fulminate of mercury as an initiator. See Explosives.

Azilian. The main period of the Mesolithic Age, transitional between Palaeolithic and Neolithic Europe. The climate, moist and warm, encouraged vast pine and birch forests. Amid these roamed the stag whose bones furnished harpoons, whereof a thousand were obtained from the Pyrenean type station of Mas d'Azil. A contemporary pygmy flint industry, best developed at Tardenois (Aisne), provided toothed edges for harpoons. Magdalenian art, disappearing with the roe deer, was replaced by pebbles painted with conventional designs suggesting picture writing. British Azilian stations include Oban, Settle, and Holderness (pit dwellings).

Azimuth (Arab *as sumut*, the paths). The horizontal angle between a star and the meridian or between a terrestrial object and the N. point of the horizon.

Azo-compounds (Gr *a*, not *zoë*, life). Azo is a short form of azote, the name given by Lavoisier to nitrogen in the late 18th century. The best known compounds are derivatives of azobenzene $C_6H_5-N=N-C_6H_5$. Many important dyestuffs come into this category, including Sudan I, benzene azo β naphthol, also Orange II, chrysoidine, Para red,

Ponceaux fast red, and Bismarck brown. Most of the modern dye stuffs are the sodium salts of sulphonic acids of the azo compounds mentioned. They are soluble in water and are used in the dyeing of both wool and cotton by suitable additions they can be made fast to light and washing.

Azoospermia. Absence of spermatozoa from the seminal fluid. This can be caused by blocking of the passages by inflammation such as may follow gonorrhoea, by inflammation of the prostate gland found in the presence of chronic infection of the sinuses, teeth, or tonsils, or from destruction of the sperm bearing tissue following mumps, or less frequently, the infective fevers. Investigation of the causes of sterility has shown azoospermia to be more frequently present than previously thought.

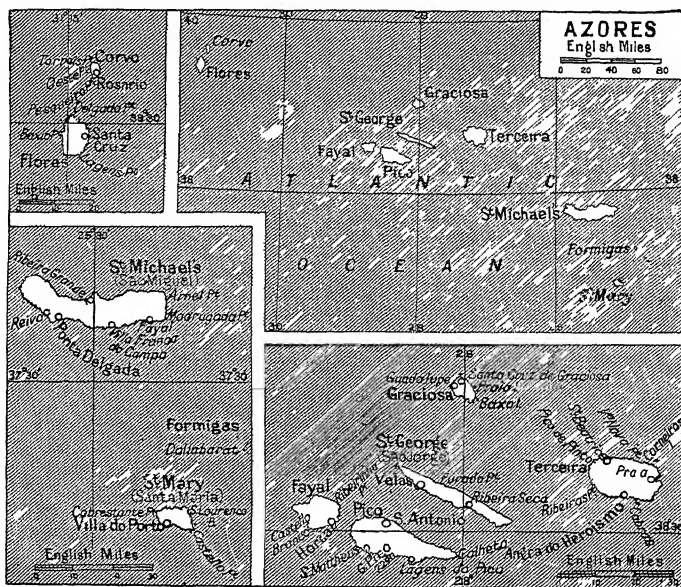
Azores (Port *Açores* hawk islands). Group of islands in the Atlantic. They belong to and form an integral part of Portugal from which they are about 830 m distant to the W. Extending over some 400 m and having a total area of 922 sq m, they form three clusters, the islands being St. Michael's 297 sq m and St. Mary with Formigas 40 sq m, in the S.E. Flores 57 sq m and Corvo 7 sq m, in the N.W. Terceira 223 sq m, Pico 176 sq m, Fayal 64 sq m, St. George 40 sq m, and Graciosa 18 sq m, in the centre. They form a chain of volcanoes which rise from the Dolphin Ridge

(see Atlantic Ocean and map, p. 753) and are subject to earthquakes and eruptions. They have rocky coasts and mountainous interiors and contain many hot mineral springs. The climate is mild.

The fauna and flora are European in character. The soil is fertile, and large quantities of oranges, pineapples, bananas, and other fruits are cultivated. Tea, coffee, and wine are also produced and fishing is extensively engaged in. The people are of Portuguese descent, with distinct strains of Moorish and Flemish blood. The principal harbour is Angra do Heroísmo, capital of the Azores on Terceira. Ponta Delgada, largest town and cap. of St. Michael's, and Horta, cap. of Fayal. Pop. 484,278.

Known apparently to the Carthaginians, the Azores were first indicated on a map in 1351. Uninhabited before the visit of Gonzalo Cabral in 1431, they were colonised by emigrants from Portugal, which country had annexed the entire group by 1457. In 1591 off Flores occurred the famous encounter between the English vessel *Revenge* and 53 ships of the Spanish fleet.

During the Second Great War Portugal granted to Great Britain the right to establish naval and air bases in the Azores, the British agreeing to withdraw at the end of hostilities and meanwhile to supply Portugal with military material. Fayal and Ponta Delgada are bases for British Overseas Airways and Pan American Airways.



Azores Maps of the islands forming this small group in the Atlantic Ocean



1 Early cutting implements of volcanic stone 2 Flint knife with ornamental handle set with stones, probably used in the human sacrifices of the Aztecs 3 Mask encrusted with turquoise mosaic 4 Example of ancient stone carving—a vase from Honduras

5 Stone mask in trachyte 6 Elaborate mosaic death mask 7 Axe head made of green quartz in the form of a human figure 8 Sacrificial collar and other implements used in religious ceremonies 9 Jade figure discovered in Peru See p 828

AZTEC. VARIOUS REMAINS OF THIS ANCIENT AND EXTINCT CIVILIZATION

Christy Collection British Museum etc

Azov. Town of Russia, in the Azov-Black Sea region. On the Don, 10 m. from its entrance into the Sea of Azov, it has a fishing industry and trades in grain, but its importance has declined with the silting up of the harbour. The Russians took it in 1696 and the British and French bombarded it in 1855. In the Second Great War German forces under von Bock captured Azov in Aug., 1942, during the heavy fighting S. of Rostov, when the invaders made their drive for the Caucasian oil-fields. By its liberation on Feb. 7, 1943, the Russians cleared the Germans from the left bank of the Don. Pop. 17,500.

Azov, SEA OF. Small interior sea, or more correctly a great gulf, of S. Russia. The Palus Maeotis of the Romans, it forms a N. appendix of the Black Sea, with which it communicates by the strait of Kerch or Yenikale, has a greatest length from the isthmus of Perekop to the mouth of the Don of 220 m., an extreme breadth of 110 m., and an area of 14,520 sq. m. Its greatest depth is about 50 ft., but at some points it does not exceed 10 ft. The narrow N.E. end is called the Gulf of Taganrog, and in the W. a long sandy strip separates it from the Sivash lagoon or Putrid Sea.

In many places the sea is unnavigable even for small vessels, and a variety of currents is set up by frequent storms, while from Dec. to March it is frozen. It receives the Don and other rivers. On its shores are a number of important towns, including Berdyansk, Mariupol, Rostov, Taganrog, and Yenikale. Its comparatively fresh waters abound in fish, the drying of which is a flourishing local industry. Occasional volcanic outbreaks have occurred, and in 1799 an island completely disappeared in this way.

The shores of the Sea of Azov were the scene of heavy fighting between Germans and Russians, 1941-43. The Germans employed large numbers of Italian, Rumanian, Hungarian, and Slovak troops. In Oct., 1941, a German army struck E. towards Rostov, while another invaded the Crimea. The Russian 9th army evacuated Mariupol on Oct. 14, and Taganrog, at the head of the Sea of Azov, was abandoned Oct. 22. The Germans announced the capture of Rostov on Nov. 22, but they were driven out a week later. Yeisk, the Soviet naval base, fell to the Germans on Aug. 7, 1942, and on Sept. 1 the Nazis crossed the Kerch straits from the

Crimea, thus encircling the Sea of Azov. On July 27, 1942, Rostov was evacuated by the Russians, and the Germans completed the clearance of the N. shores. Rostov was recaptured by the Cossack Guards div., Feb. 14, 1943, and the invaders evacuated Taganrog on Aug. 30. Mariupol was liberated on Sept. 10, and by early Dec. the Germans were finally driven from the area.

Azrael. Angel of death and, according to Mahomedan belief, one of the four angels most in God's favour. One of the creation-legends runs that the three other angels had each been sent to get the earth of which Adam was to be formed and returned without it, knowing that man would bring a curse upon the world; but when Azrael was sent he performed his task without remorse, and so came to be appointed by God to separate souls from bodies at death.

Aztec (crane people). American Indian tribe inhabiting the Mexican tableland at the time of the Spanish conquest. Probably of Shoshonian stock and speaking a Nahuatl dialect, their name popularly embraces all ancient Mexican tribes of Nahuatl stock, whose descendants are called Mexicanos.

The primitive Nahuatl, travelling along the Rocky Mt. valleys from the British Columbian coast, found on the tableland, which they called Anahuac, scattered *pueblos* of Otomi, who had driven still earlier peoples into the outlying valleys and hills. Along the coastal fringes lay other tribal groups, and E. of the Tehuantepec isthmus the Maya peoples. Adopting a sedentary life, they came under the influence of an advanced culture, marked by weaving, metal working, temple-pyramids or *teocallis*, and massive architecture.

About the 12th century there arrived at the Texcoco Lake a nomad hunting tribe, who attached themselves to the Tepecanec *pueblos*, by whom they were called Aztec. Their warlike aptitude gained for them, about 1325, the opportunity of fortifying the Tenochtitlan island, now Mexico city. Electing a king in 1376 and defeating the Tepecanec in 1428, they secured the hegemony of the valley. The central *pueblos*, formed into various confederacies, waged war with organized armies upon the outlying peoples. These confederacies had extended to both oceans when Montezuma II (*g.v.*) was deposed by Cortes in 1519.

The Aztec civilization, taken over from subjugated peoples,

embraced several elements clearly due to cultural drift from the Old World. The elective chiefs were held in check by a priestly aristocracy, which exploited the servile peasantry. Taxation was heavy, justice severe; but commerce was honoured, and education advanced. The lack of food-animals adaptable to domestication led to systematic cannibalism under religious sanctions, which governed every aspect of the social life. **E. G. Harmer**

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




Azuaga. Town of Spain, in Badajoz province. It is 54 m. by rly. N.W. of Cordova, and has a market for cattle, silver-lead mines, and Roman remains. Pop. 16,600.

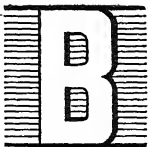
Azuay. Province of S.W. Ecuador. A mountainous district about 3,873 sq. m. in extent, it has quicksilver mines, produces cinchona and maize, and rears cattle. Cuenca, the capital, is the seat of the university of Azuay. Pop. (est.) 236,800, mostly Indians.




Azulejos. Square blue-glazed tiles. They were largely employed by the old Moorish builders, notably in the Alhambra at Granada, where they occupy almost the entire lower third of the wall-space. They resemble, in their glazing and colouring, the ancient majolica. Azulejos tiles were, perhaps, made by a similar process, in which an opaque metallic enamel was spread over a basis of calcareous clay. The Spanish word *azulejos*, compounded of *azul*, blue, and *lejos*, remote, rather happily conveys the effect of the subdued colouring of the tiles. *See* Alhambra.

Azure. Name for blue in heraldry. It is represented in uncoloured engravings by a series of horizontal lines. *See* Tincture.

Azymite (Greek *a*, not; *zymē*, leaven). Controversial term of reproach used in the Eastern Churches for those who use unleavened bread in the Eucharist. The practice of the Oriental Churches has always been to use a special form of leavened bread, this having apparently been the custom of the Church in the earliest days. Unleavened bread was habitually used in the Western Church certainly in the 7th century, and probably in the 3rd. In the 11th century this use was made a ground of separation from the Latin communion by the Greek Church. *See* Eucharist.

THE early pictographic symbol corresponding to the letter B in the writing of the ancient Egyptians (c. 5000 B.C.) was in the shape of a bird , eventually simplified in the course of some 200 years until it resembled more the shape of a tent or house . The Phoenicians and Hebrews, adopting the symbol in their own alphabets, named it both, their word for house. The Phoenician form of the letter was , but in the primitive Greek alphabet, based on the Semitic, the compartments of the tent, so to speak, had become doubled, giving the shape of  or . Primitive Latin (c. 800 B.C.) adopted the  second of



these two forms, which became the classic Greek  (beta). The minuscule form (see under  A, page 1) was . The classic Roman alphabet formalised the familiar B of the English alphabet. The modern minuscule b reverts to the ancient practice of bearing only one loop. During the 4th century A.D. the Greek beta began to approximate in sound to the English v, which in modern Greek exactly represents it. The Russian language, based on medieval Greek, has developed similarly; thus the b of Sebastopol is sounded like a v, and Sevastopol is therefore an equally correct, if not better, English spelling.

B Second letter of the English, Latin, and most European alphabets. In English pronunciation B is a soft labial or lip-sound, the corresponding hard sound being P. It always has the same value as in *baby*, but is sometimes not heard when preceded by m or followed by t, as in *dumb*, *debt*, *subtle*. In such cases it may lengthen a preceding vowel, as in *climb*, *comb*. B frequently occurs in words coined to express various sounds, e.g. *baa*, *babble*, *bleat*, *buzz*. It also has its uses as an expletive, as in *bah!*, *boo!*, and such formless expressions as *br-r-r!* See Alphabet.

B. In music, the seventh note of the natural scale of C. It is called in France and Italy *Si*, and H in Germany, where B flat is called B. The most useful of the orchestral and military clarinets, pitched in B flat, is also known as the clarinet in B. See Key Signature; Pitch.

Baal, BEL, OR BEEL. Semitic title meaning possessor, lord, given to various primitive inferior deities. The feminine form is Baalat or Beltis. The supposed god Baal is now regarded as a late theological abstraction, and the term is used for numerous local genii, though the title baal might be bestowed upon any great god, as the possessor of the local shrine. Only in Babylon did it ever become the actual name of an individual god, Bel—the Lord, i.e. En-lil, the chief Babylonian deity. His consort, Nin-har-sag, was known as Belit, the lady. Bel absorbed the identities of many lesser beälim, and his prominence led the Greeks to conclude that these local baals were variants of the chief deity, instead of being entirely independent and of much older origin. Baal has been traditionally identified with the sun-god, but this is true only of certain localities.

These baals have been classified under ten headings, including baals

of springs, trees, animals, mountains, stones, and sanctuaries. When the Hebrews conquered Canaan they came in contact with local beälim, and in spite of the opposition of the prophets eventually absorbed their worship into a debased service of Yahweh. Later the baal of Tyre, Melkart, was introduced by Ahab's marriage with Jezebel. This was the baal-worship that had to be suppressed by fire and sword (1 Kings 18). Melkart was merged into the local baal of Tyre and became an important Phoenician deity and a national emblem. His cult was carried to distant lands and connected with that of other local baals.

The Baal cult represents polydaemonism, a very early stage of religious development. It was in essence a worship of the male forces of nature, frequently co-existent with the cult of Asherah (tree) and of Ashtaroth, the goddess of fecundity. Certain of the local saints worshipped today in Palestine by Jews, Moslems, and others are modern equivalents of the old beälim. The word is incorporated in many names of persons and places, e.g. Jezebel, Baalbek. Consult Religion of the Semites, W. Robertson Smith, 3rd ed. by S. A. Cook, 1927.

Baalbek OR THE CITY OF BAAL. Ancient Syrian city, 35 m. N.N.W. of Damascus. Situate 3,850 ft. above sea level, on the watershed from which the Orontes flows N. to Antioch and the Litani S. to Tyre, it commanded an important Phoenician trade route, and became an early centre of Baal-worship. There are, however, no identifiable remains of pre-Roman age. The assimilation of Baal with the Greek sun-god Helios gave rise to the name Heliopolis, city of the sun.

In the 2nd century A.D. Antoninus Pius began the erection of two great temples which impress the beholder, even in decay, by their massive construction and by their decoration. The great temple of Jupiter-Baal rests upon an artificial terrace, in one wall of which the fourth course comprises six limestone monoliths each 30 ft. long. Upon these rest three others averaging 63½ ft. each, from which the temple acquired the name of the Trilithon. All these stones are 13 ft. high, and probably deeper. In a quarry a mile away an unfinished monolith, 68½ ft. long, and weighing 1,100 tons, is of the exact length of Cleopatra's Needle in London, but six times its bulk. Upon the terrace, and approached by portico, forecourt, and great



Baalbek, the City of Baal, Syria. Remains of the two great Roman temples dedicated by Antoninus Pius in the 2nd century A.D.

court, rose a temple surrounded by 54 columns 60 ft. high, with Corinthian capitals 22 ft. round. Of these only six remain standing, much damage having been done by earthquake in 1759. A smaller Bacchus temple adjoining was surrounded by 46 Corinthian columns 52 ft. high, and entered by a richly carved portal, flanked by two hollow columns containing winding staircases.

The Jupiter-worship at Heliopolis retained many Syrian features, with much licentiousness. In the great court Theodosius built a Christian basilica. The ruins of this and of later Saracenic constructions were cleared away during O. Puchstein's excavations in 1899-1904. Baalbek was captured by Jenghiz Khan, Saladin, and Timur, became Turkish in 1840, and was occupied by the British in Oct., 1918. Pop. 4,600.

Baasha. Son of Ahijah. He seized the throne of Israel after killing Nadab and all the family of Jeroboam I (1 Kings 15, 16). He reigned 24 years, chiefly occupied in war against Judah.

Baba (Turkish, father). Mahomedan title of respect. It is a form of address for religious dignitaries, especially ascetics, such as Indian fakirs, and is sometimes added to names, e.g. Ali Baba.

Baba. Old woman or witch in Slavonic folk-lore: in full, Baba Yaga. Generally represented as a terrible ogress and cannibal, she is a distorted survival of the Berchta (*q.v.*) of S. German myth.

Baba. Headland of Asia Minor. The ancient Laetum, it is the most westerly point of Asia. It stands at the entrance to the Gulf of Adramyti, about 12 m. N. of Mitylene. On its S. slope is a village of the same name.

Baba Budan. A mt. range of India. In the Kadur district of Mysore state, it is in the form of a crescent, 35 m. in length, and its highest point is Mulaingiri (6,317 ft.). Baba Budan is the centre of coffee plantations in S. India. The name is derived from a Mussulman saint, Baba Budan, who took up his residence on the range.

Babahoyo OR BODEGAS. Town of Ecuador, capital of Los Rios prov. On the Guayas river, 40 m. direct and about 75 m. by boat N.E. of Guayaquil, it is in a district producing cotton, cocoa sugar, rice, and tobacco.

Babal OR BALFRUSH. Town of Persia. In the province of Mazanderan, it lies 12 m. S. of the Caspian and about 100 m. S.W. of Tehran, on the unnavigable

Bhawal. It has a large trade, partly by caravan, partly through its port Meshed-i-Sar, and the exports include silk, cotton, and rice. Commerce with Tehran and the interior is also practicable by road. Pop. 30,000.

Babalan Channel. Roadstead in Aroe Bay, N.E. Sumatra. It is lighted at night by gas buoys, has a good anchorage, and leads to the port of Pangkalan-Brandan, which exports petroleum.

Babar OR BABER (c. 1483-1530). Mahomedan conqueror. His real name was Zahir ed-din Mohammed, and he was called Babar, the tiger, from his fighting qualities. When a boy he succeeded his father, a descendant of Timur, as khan of Ferghana. His career of conquest began almost at once, when he took Samarkand, but he lost this and also his own inheritance, finding his real field of adventure in Afghanistan and India. In 1504 he captured Kabul, and in 1511 recovered Samarkand, but was unable to hold it.

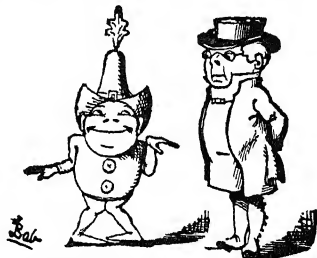
Babar next invaded India at the invitation of some subjects of Ibrahim, ruler of Delhi. At Panipat in April, 1526, Ibrahim was defeated and killed, and Babar took Delhi and Agra, making the latter his capital. Another victory (1527) made him ruler of much of N. India, the empire he established being usually known as the Mogul. He was succeeded by his son Humayun. His tomb is at Kabul. *Consult* Memoirs, Eng. trans. J. Leyden and W. Erskine, 1826; Babar, S. Lane-Poole, 1899; Baber, First of the Moguls, F. Grenard, 1931.

Babbacombe Murder. Crime rendered memorable because of three abortive attempts to hang the murderer. John Lee, aged 20, was convicted at Exeter Assizes, Feb., 1885, of the murder of his employer, Miss Keyse, an elderly lady living in a bungalow, The Glen, on Babbacombe Beach, near Torquay. Lee, who had been in Miss Keyse's employment as a boy, was taken back after an interval, during which he had been in the navy and had served six months' imprisonment for theft. On Nov. 16, 1884, early in the day, Miss Keyse's bedroom was discovered in flames, and her body, hacked with an axe, was found in the kitchen. The circumstantial evidence against the prisoner appeared overwhelming, but he steadfastly maintained his innocence. After three abortive attempts to execute him, Feb. 23, 1885, Lee was reprieved

and his sentence commuted to imprisonment. He was released Dec. 18, 1907.

Babbage, CHARLES (1792-1871). British mathematician. Born at Totnes, Devonshire, Dec. 26, 1792, and educated at Trinity College and Peterhouse, Cambridge, he became Lucasian professor of mathematics in the university, and was one of the founders of the Astronomical Society and the British Association. His numerous publications included tables of mortality, a table of logarithms, the ninth Bridgewater Treatise, and an autobiographical work, *Passages from the Life of a Philosopher*, 1864. He is remembered as the inventor of a calculating machine, which is preserved in South Kensington Museum. He died in London, Oct. 18, 1871.

Bab Ballads. Farcical verses written and drolly illustrated by William Schwenk Gilbert (*q.v.*)

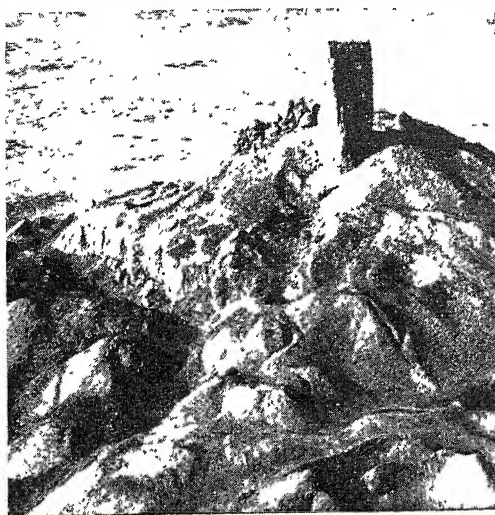


Bab Ballads. One of Gilbert's characteristic illustrations to his own verses

They were originally issued in two series, *Bab Ballads: Much Sound and Little Sense*, 1869, and *More Bab Ballads*, 1873. Some of them, notably *The Yarn of the Nancy Bell*, long enjoyed popularity.

Babbitt. Novel by the American writer, Sinclair Lewis (*q.v.*). Published 1922, it secured a reputation on both sides of the Atlantic first established with his previous novel, *Main Street*. The entertaining portrait of George F. Babbitt, a leading estate agent in the flourishing modern city of Zenith, and the story of his social, business, domestic, and cultural aspirations, heroisms, and follies, forms in effect a relentless ironical comment on the limitations of the average contemporary middle-class American citizen.

Babbitt Metal. Alloy, usually of copper, tin, and antimony, belonging to what are known as white or anti-friction metals, named after the American inventor, Isaac Babbitt (1799-1862). It is used for the bearings of shafts. *See* Anti-friction Metals.



Babel. Fragment of the temple of Nabu, marking the site of ancient Borsippa, near Babylon, and known traditionally as the Tower of Babel.

Photo, Royal Air Force Official, Crown copyright

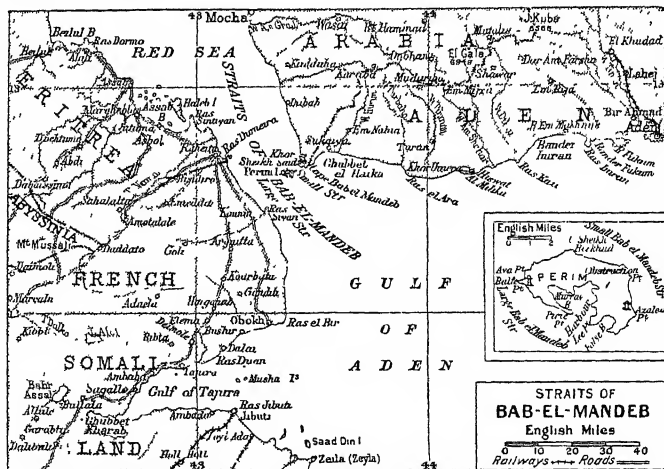
Babel, ISAAC (b. 1894). Russian novelist. Born in Odessa, of Jewish parents, he fought with Budenny's army in Poland against the Cossacks, 1920, and based his famous Red Cavalry, 1926 upon his own experiences. This book is not a novel but a series of vivid impressionistic sketches. Babel's Jewish Tales, 1927, gave a colourful picture of the Odessa Jews, his compatriots. He also wrote plays of which The Sunset and Maria were the most successful.

Babel, TOWER OF. Tower erected after the Deluge by the descendants of Noah, when in their wanderings they reached the plain of Shinar or Babylonia. The plan was to build both a city of brick and a tower reaching to heaven; but Jehovah frustrated it by confusing the language of the builders so that they could not understand one another—hence the diversity of human speech; and by scattering them all over the earth—hence the diversity of human race. The story (Gen. 11) accounts for the name Babylon (Babel), for the high towers which the newcomers saw in Babylonia, and for the difference of language they noted.

It is now known that stage-towers or *zikkurats* were a characteristic feature of the sacred architecture of Babylonia and Assyria, and the ruins of two such towers associated by native tradition with the Tower of Babel, have been discovered at Birs Nimrud (Borsippa, near Babylon) and at Akerkuf farther south. Sir Henry Rawlinson's investigations at Birs Nimrud showed that the tower of

jecting like a fang above the rubbish. In the narrative in Genesis popular etymology connects the name Babel (Babylon), which is really Assyrian and means "gate of God," with a Hebrew root *balal* "to confuse." Consult Digging Up the Past, C. L. Woolley, 1930.

Bab-el-Mandeb, STRAITS OF. Channel separating Arabia from Africa. Called by the Arabs the Gate of Tears because of its difficult navigation, it leads from the Red Sea to the Indian Ocean through the Gulf of Aden. About 15 m. wide. It is divided by the island of Perim into Large and Small Straits, both of which have strong currents.



Bab-el-Mandeb. The straits which divide Africa and Arabia, with inset map of the island of Perim, a British possession

Borsippa was called *E-ur-min-ni-ki*, "House of the seven divisions of heaven and earth," and symbolised the entire universe, connecting the earth, as it were, with the heavens. It consisted at the beginning of the 6th century B.C. of seven stages, one superimposed upon the other and receding in circumference as one proceeded from stage to stage." Of the great tower all that remains is a ruined mass of brickwork, projecting like a fang above the rubbish.

Babes in the Wood, THE. The popular name of a black-letter ballad in the Pepys collection and reprinted in Percy's Reliques. The full title is The Children in the Wood; or, The Norfolk Gentleman's Last Will and Testament. It was first printed in 1595, and the scene is usually associated with Wayland Wood, near Watton, Norfolk; but in an old play, attributed to Robert Yarrington and printed in 1601, it was laid in Padua. The tale has often been adapted to make a Christmas pantomime, in which Robin Hood and Maid Marian appear as principal boy and girl; their introduction dates from a Drury Lane production of the 1880s. Consult The Land of the Babes in the Wood, 1910, and The Ballad of the Babes in the Wood and All About Them, C. Kent, 1913.

Babeuf, FRANÇOIS NOËL (1760–97). French social revolutionist. Born at St. Quentin, Nov. 23, 1760. Babeuf, the son of an officer in



F. N. Babeuf, French revolutionist

poor circumstances, became clerk to a land surveyor. On the outbreak of the Revolution of 1789, he was identified with the extremist section represented by Marat (*q.v.*). From 1793, when he started a paper, *Le Tribun du Peuple*, advocating the displacement of private property by communism, he opposed Robespierre.

In 1794 he settled in Paris, and was imprisoned for anarchist propaganda. His chance came in 1796

with the outbreak of the distress caused by the cessation of the distribution of free food in Paris, and the fall in the value of the assignats. Caius Gracchus Babeuf, as he called himself, demanded a new Reign of Terror and the establishment of communism. Before the rising he had planned could mature the plot was betrayed, Babeuf was arrested, and after a long trial was executed at Vendôme, May 27, 1797. *Consult* The Last Episode of the French Revolution, E. Belfort Bax, 1911.

Babi. Name given to a Persian religious sect, from the title Bab-ed-Din, Gate of the Faith, borne by its founder. Its creed, based upon Mahomedanism, rejects many of the tenets and practices of the orthodox Muslim. It borrows from the pantheism of Buddha and the ethics of Christianity, combined with a mysticism alien to Islam, though akin to the doctrines known among Muslims as Sufism. Babism dates only from 1843.

Bab-ed-Din was opposed by the religious authorities; but his disciples went forth as missionaries, notable among them being a woman of great beauty and noble character known as Gurred-ul-ain (consolation of the eye). The new doctrines were so repugnant to the authorities that the Bab was imprisoned and executed in 1850, and his followers were suppressed by the sword in the reign of the shah Nasr-ed-din. This was not surprising, as the Bab had declared himself to be the "central point" of a new divine revelation, and his followers recognized him as the universal lord.

The sect, however, in spite of prolonged persecution, varied by an attempt on the life of the shah, was by no means completely suppressed, though its followers ostensibly conformed to the doctrines and practices of orthodoxy. It has now many adherents not only in Persia, but in India, China, Japan, and N. Africa. *Consult* A Traveller's Narrative to illustrate the Episode of the Bab, E. G. Browne, 1891.

Babington, ANTHONY (1561-86). English conspirator. He was born at Dethick, Derbyshire, of an old and wealthy family, and was in youth a page to Mary Queen of Scots, during her imprisonment at Sheffield. An ardent Roman Catholic, in 1586 he took a leading part in a conspiracy for the removal of Queen Elizabeth and her ministers and the release of Mary. The plot was made known to Walsingham by his spies, the conspirators were arrested, Aug., 1586, and condemned, Babington being

hanged, drawn, and quartered at Lincoln's Inn Fields, Sept. 20. *Consult* History of England, vol. xii, J. A. Froude, 1856-70.

Babington, CHARLES CARDALE (1808-95). British botanist. He was born at Ludlow, Nov. 23, 1808, and educated at Charterhouse and S. John's College, Cambridge. His Manual of British Botany, 1843, revolutionised British botany by substituting for the Linnaean system the arrangement of De Candolle. In 1861 he succeeded John Stevens Henslow as professor of botany at Cambridge, where he died July 22, 1895.

Babington, SIR JAMES MELVILLE (1854-1936). British soldier. Born July 31, 1854, he entered the 16th Lancers in 1873, served in Bechuanaland 1884-85, and was a staff officer in India. He commanded the 1st cavalry brigade in the Boer War but was removed for extreme caution in 1900. From 1902 to 1906 he commanded the New Zealand defence force. He took the new 23rd division to the western front in 1915. Knighted in 1917, he commanded the 14th army corps, 1918-19. Babington died June 15, 1936.

Babington, WILLIAM (1756-1833). British physician. He was born in co. Antrim, and during his youth became assistant to a doctor in Londonderry, afterwards studying medicine at Guy's hospital, London. After four years at the naval hospital, Haslar, he returned to Guy's, where in 1795 he was appointed physician. He resigned in 1811 and died April 29, 1833. Among Babington's interests was mineralogy; a meeting which he called in 1807 led to the foundation of the Geological Society (*q.v.*), of which he was president in 1822. He was also a founder of the Hunterian Society.

Babirusa (Malay, deer-hog). *Babirusa alfurus*, a wild pig found in the E. Indies. The male is characterised by the extraordinary development of its canine teeth, which grow through the skin of the snout and curve backwards over the forehead. The sow lacks these teeth.

Bablockhythe. Locality on the Thames, England, 6 m. W. of Oxford. A ferry plies between the Berkshire and Oxfordshire banks of the river, which is noted here for boating and angling. The spot is well known from Matthew Arnold's mention of it in The Scholar Gipsy, and Laurence Binyon wrote a poem about it. Bablockhythe is connected by the Long Leys with Cumnor, scene of the death of Amy Robsart in 1560.

Baboon. Monkey of the genus *Papio*, which includes the drill, hamadryad, mandrill, and sphinx.



Baboon. Mother and child of this ferocious breed of monkey

Baboons are ugly and ferocious. Their fore and hind limbs are nearly equal in length, so that they run on all fours with ease. All have brightly coloured bare callosities on the buttocks, and the tail is usually short. The jaws are of remarkable strength, and the formidable tusks make the bite very severe. Most baboons have their home among the rocks, and their predatory habits render them a serious pest to farmer and gardener. All true baboons are natives of Africa and Arabia. *See* Monkey.

Babbie, SIR WILLIAM (1859-1920). British army surgeon. Born May 7, 1859, he studied medicine at Glasgow university. In 1881 he entered the Army Medical Service, and in 1901 became an assistant director-general. Meanwhile he had served in the South African War, and won the V.C. for tending the wounded under fire at Colenso. Director of medical services in India from 1914, he was responsible for the care of the wounded in Mesopotamia, and the breakdown of the arrangements in the earlier part of the campaign was the subject in 1917 of a special inquiry, which did not entirely exonerate him. He was knighted, however, and in 1918 was promoted inspector of medical services. He died Sept. 11, 1920.

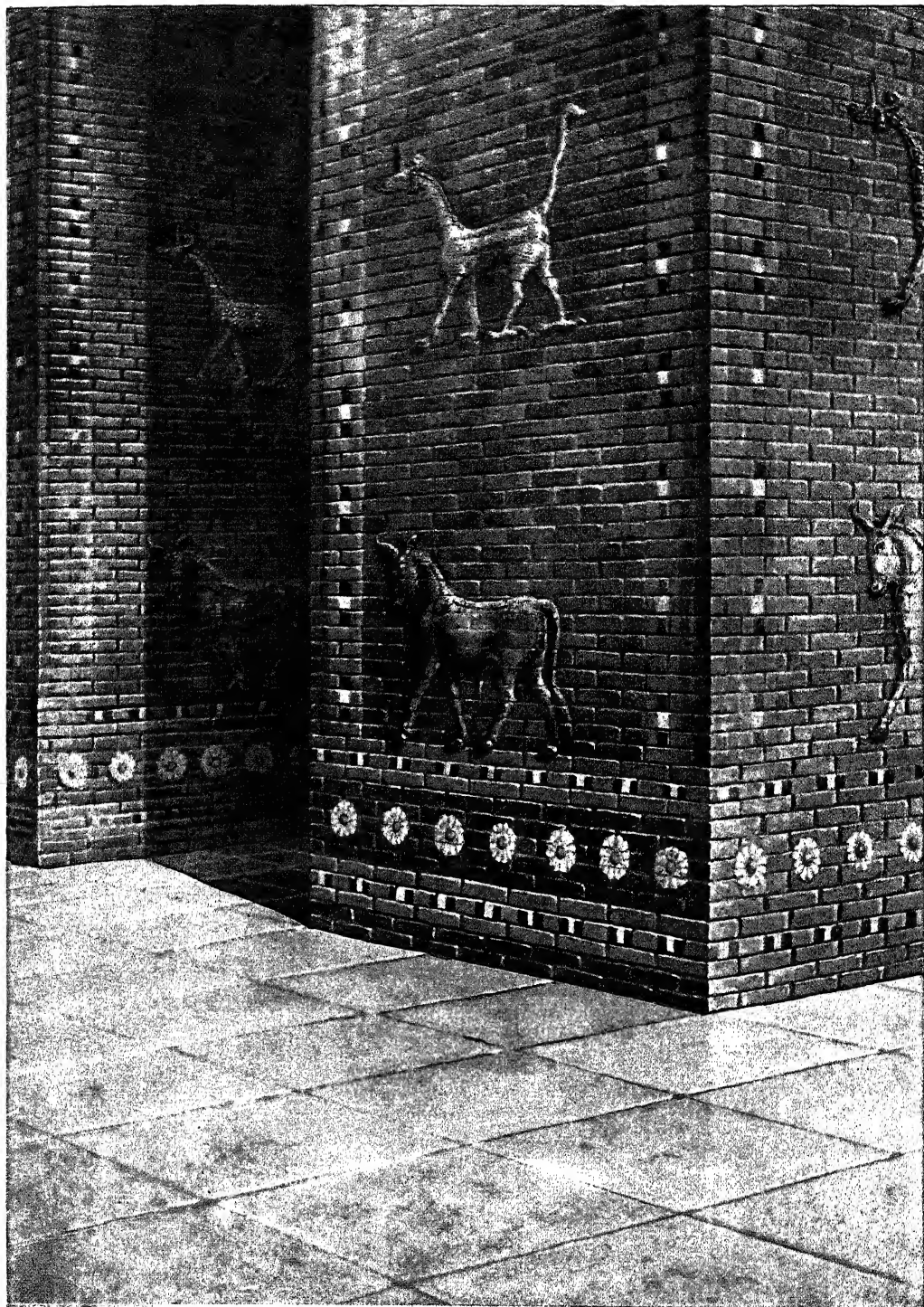
Babu. Anglo-Indian name for a native with a smattering of education, generally for a clerk who writes English.



Babul tree, *Acacia arabica*

It was originally a term of respect, like Mr., but is now seldom so used.

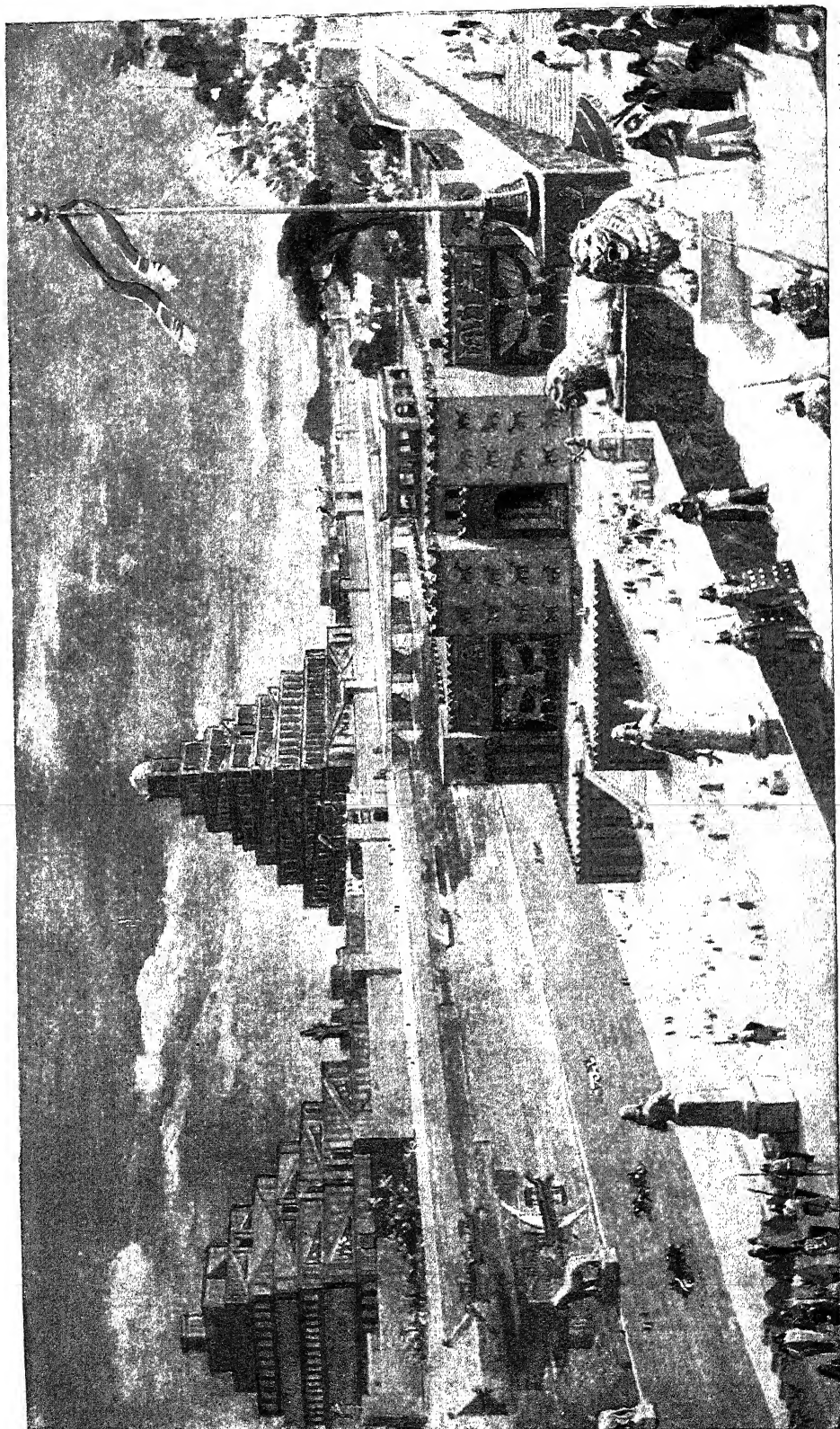
Babul. Indian name for *Acacia arabica*, one of the trees which produce gum arabic.



The Ishtar Gate, as first constructed, was not enamelled; but when Nebuchadrezzar raised the level of the sacred way that ran from the gate to the temple of Marduk, the buildings along it were also raised, including the gate, which the king then adorned with relief figures of dragons and bulls in polychrome enamelled brick. Only the lower courses of this later gate have survived

BABYLON: ENAMELLED TILES OF THE REMODELLED ISHTAR GATE

From Koldewey, "Das Ishtar-Tor in Babylon"



In the centre background rises the Temple of Bel, which was also used as an observatory. To the left is seen the terraced Tower of Seven Stages. The Royal Palace, built on both sides of the Euphrates, was connected by a tunnel beneath the river, which was spanned by a bridge 1,000 yards long and 30 feet broad. In the right middle distance appears a part of the famed "Hanging Gardens." Enclosing Babylon was a wall with 100 gates, measuring 36 miles and embracing harvest fields, gardens, temples, and other buildings in keeping with the central part shown above. Canals connected the Euphrates and Tigris and there was a busy trade in trade boats

BABYLON: THE GREAT CITY OF NEBUCHADREZZAR AS IT APPEARED IN THE ZENITH OF ITS SPLENDOUR

Babuyan Islands. A group of small volcanic islands forming part of the Philippines. They lie N. of Luzon and S. of the Bataan group. Of the chief islands Kamiguin has an area of 65 sq. m.; Babuyan Claro, 38 sq. m.; and Calayan, 30 sq. m. Musa, on Musa Island, is the principal town. Grain, rice, and tobacco are grown, and livestock and lard exported. Pop. 11,000.

Baby-Farming. Term for the reception, lodging, and boarding of infants for money considerations. In most countries baby-farming is strictly regulated by law. In 1871 a select committee was appointed by the House of Commons to inquire into the mortality arising from various malpractices in baby-farms, especially as regarded illegitimate children, such as the transfer of babies for a single payment, and without adequate safeguards for their proper treatment.

By the resulting Act of 1872 baby-farming houses had to be licensed and registered, and breaches of the Act visited by heavy penalties. This Act was superseded in 1897 by the Infant Life Protection Act, making notification to the local authorities obligatory. The law is now contained in the Public Health Act, 1936. The Acts of 1872 and 1897 applied only to cases where more than one child was received. The present law, besides imposing stringent regulations, is applicable to cases where a single infant is taken. A notorious criminal baby-farmer was Mrs. Dyer, who was executed June 10, 1896, after she had been convicted of several murders. See Adoption; Children, Law concerning.

Babylon. Ancient city of Asia. It was situated on the Euphrates, in an extensive and fruitful plain, about 60 m. S. of the modern Bagdad. The capital of the Babylonian and then of the Assyrian empire, its period of greatest glory extended from 1800-538 B.C., with a short break about 689, when the city was partly destroyed by Sennacherib.

Its history is to a large extent that of Babylonia.

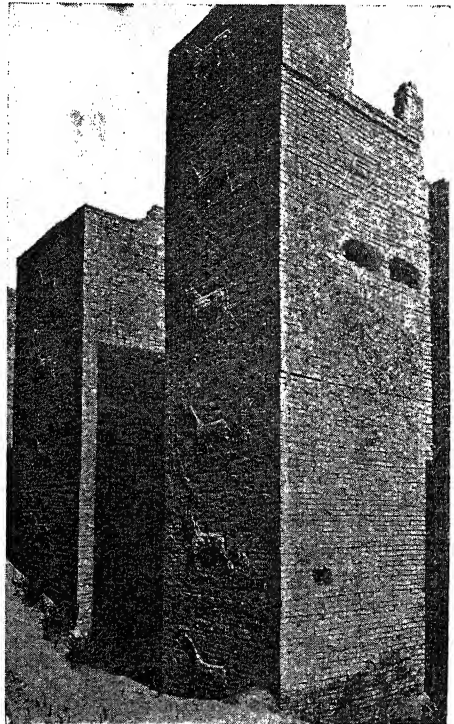
Babylon was built on both banks of the Euphrates, and consisted of palaces, temples, and fine streets. Its ruins, among which the modern town of Hilla or Hillah stands, extend over an area of 50 sq. m.

The origin of the city is so remote as to be lost, but explorations indicate a date as early as 7000-6000 B.C.

There were two, perhaps three, Babylons superimposed the one above the other. The remains are associated mostly with the temples, for the people of Babylon were very religious, and showed great devotion in the worship of their god Marduk, the Merodach of Jeremiah 1, 2. The huge mound at Borsippa, which was a suburb of the city, is called Birs Nimrod, and commemorated Nimrod, the first great king of Babylon, who built there a temple of Marduk also known as the temple of Nebo.

In the rich plains of lower Mesopotamia there dwelt many

tribes, and somewhere about 2300 B.C. Babylon became their acknowledged capital. That city endured for more than sixteen centuries, and after Sennacherib, king of Assyria, had swept down upon Babylon and reduced it to ruins, it was rebuilt and again became



Babylon. Air view of the partly excavated city. Across the top is the Euphrates, with a modern hamlet of Iraq on its farther bank. Three distinct Babylons have been built upon this site.

Above, towers of the Ishtar Gate, ornamented with bulls and dragons in enamelled relief

Upper photo from Koldewey, "Das Ishtar-Tor"

one of the mightiest cities in the world under Nabopolassar and Nebuchadrezzar.

The ruins of this city have been thoroughly explored. They are in a series of gigantic mounds, and have been divided into sections, of which the chief are Babil, El Kasr, and Amran-ibn-Ali, the names being given by the local Arabs and representing the local tradition. In these mounds German excavators made many discoveries from 1899 to about the outbreak of the First Great War. The Hanging Gardens have been located in the N. part, and in El Kasr the remains of the palace of Nebuchad-

rezzar and the temple of Esagila have been brought to light. Belshazzar succeeded Nebuchadrezzar; then came Cyrus in 538, and Babylon passed to the Persians, who gave way in their turn to Alexander, who died here. From that time the city dwindled, until nothing was left but ruins burned in the sand. These are described in *The Excavations at Babylon*, R. Koldewey, 1914, Eng. trans. A. S. Johns; the *Cambridge Ancient History*, vol. 1, 1923, may also be consulted. L. W. King's *History of Babylon*, 1915, remains a standard work.

Robert Machray

BABYLONIA: 'LAND OF THE CHALDEES'

Rev. T. WITTON DAVIES, Prof. of Semitic Languages

This survey of one of the world's great empires belongs to a group of articles that includes Assyria, Mesopotamia, Egypt, Palestine and Persia. See also Archaeology, Hieroglyphics, Tigris, etc

The word Babylonia comes from a Greek word similarly spelt, and stands for the country as Babylon in Greek stands for the city. The latter is the Greek form of the original Babylonian, *Babil*, or gate of God, or later *Babilani*, gate of the gods. In the earliest age of inscriptions, about 4200 B.C., the country so designated has no name at all. About 2500 B.C. N. Babylonia came to be called Uri or Kiuri, and S. Babylonia Engi or Kengi. Some centuries later the names Akkad (Babylonian *Agade*) and Sumer came to be used for N. and S. Babylonia respectively.

Position and People

Babylonia was as truly the gift of the Tigris and Euphrates as Egypt is of the Nile. It was a low-lying country between these two rivers, made up of alluvial deposits brought down from their sources in the Armenian mountains. It was bounded on the N. by Assyria, S. by the sea land and Kaidu (Chaldea), E. by the mountains of Elam, and W. by the Syrian and Arabian deserts. Through the alluvial deposits the land gains upon the sea at the rate of about 3 m. in 100 years. Eridu, once a busy port, is now 150 m. N. of the Persian Gulf. The country was a network of canals, a source of relief to the rivers when in flood. They were largely used for irrigation and were a valuable means of travel and transport. But the great force with which the rivers overflowed their banks often wrought havoc to the latter, so that they had constantly to be repaired. In their inscriptions Babylonian kings frequently boast of digging new canals or mending old ones.

The oldest inhabitants of the country that came to be called Babylonia were the Sumerians,

who dwelt in the S., spoke a Turanian language, and exhibit types of face and costume wholly un-Semitic; in the N. were the Akkadians, a Semitic race whose original home was probably Arabia. The earliest culture of Babylonia was Sumerian, but the Semites of N. Babylonia took over the cuneiform script, much of their intellectual culture, and their religious ideas. Since the Assyrians were indebted both intellectually and religiously almost wholly to the Babylonians, the relation is the same between Sumerian, Babylonian, and Assyrian as that between Mycenaean, Greek, and Roman, i.e. each in the two triads was greatly indebted to the one that preceded it.

History of the Territory

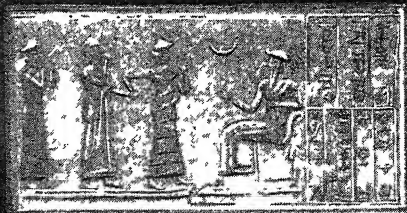
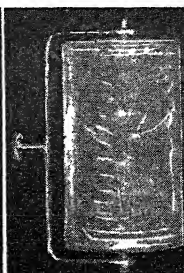
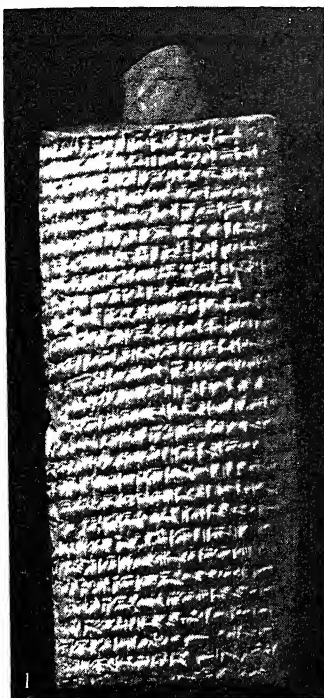
Although the name Babylonia is of comparatively recent origin, the history of the territory so designated and its people can be traced back in written records still existing—some in the British Museum—to at least 4200 B.C., and yet even at this remote period the culture of the people stood at a very high level. Their mode of writing, the cuneiform, is a development from the pictorial or hieroglyphic style, but so different that the original forms cannot be traced except in a few cases, so that there must have been centuries of gradual evolution. Moreover, they had houses, artistically and conveniently built, walled cities, and canals; and the remains of art—sculptural, architectural, etc.—which have come down to us exhibit a remarkably advanced stage of development. It can hardly be an exaggeration to say that between 6000 and 5000 B.C. these Babylonian peoples existed and had entered upon a career of civilization. In S.

Babylonia a pre-Sumerian element is implied in the language, customs, and ideas of the Sumerians, and recent investigators have come to the conclusion that this element was Semitic. In favour of this theory Eduard Meyer, the Berlin historian, points to the features and dress of the Sumerian gods as Semitic in character. These gods have long, thick hair with large, bushy beards. The Sumerians themselves, on the other hand, were clean faced, and their heads usually bare. These gods are dressed in woven woollen plads, not in cloaks in the manner of the Sumerians. And the physical characteristics of the gods are Semitic, not Sumerian. Meyer holds that when the Sumerians conquered the territory north-west of the Persian Gulf and settled in the newly gained country, they took over the gods of the conquered Semites, assimilating to them the gods which they themselves had worshipped.

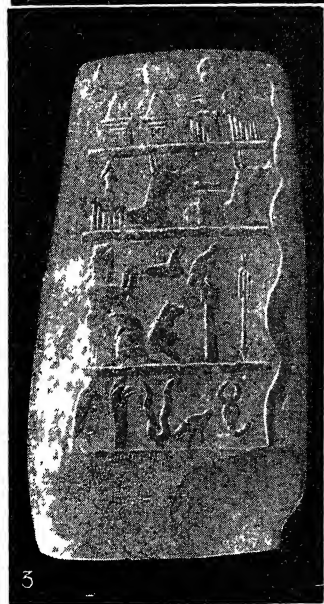
THE CITY STATES Assyria began its career with one city state only, that of Ashur, which grew to be a kingdom and then an empire; but in early Babylonia there was a large number of independent city states, all more or less in active hostility to one another, each seeking to enlarge its borders at the expense of its neighbour or neighbours. It is not until a comparatively late date that we read of one king exercising sovereignty over a large number of cities, or over an extensive tract of land. The chief ruler of these city states was called *patesi*, corresponding to the Assyrian *ashshakku*, words used of the ruler of a city that was subject to another. When a city state was independent, especially if it had other cities subject to it, the chief ruler was called *sharru* or king. This distinction, however, is not consistently kept up in the existing records, and there are some who hold that *sharru* was simply a more dignified title than *patesi*.

The following were the more ancient city states: in N. Babylonia, Kish, Opis, Sippar, Kutha, Agade (Akkad, Gen. 10), and Babylon; in the S. Lagash, Shuruppak, Ur of the Chaldees, Erech (Gen. 10), Eridu, Umma, and Adab. Each had a tutelary deity, for whom a temple was built. There were in most cities many temples dedicated to as many deities, probably because several tribes made their homes in the same city.

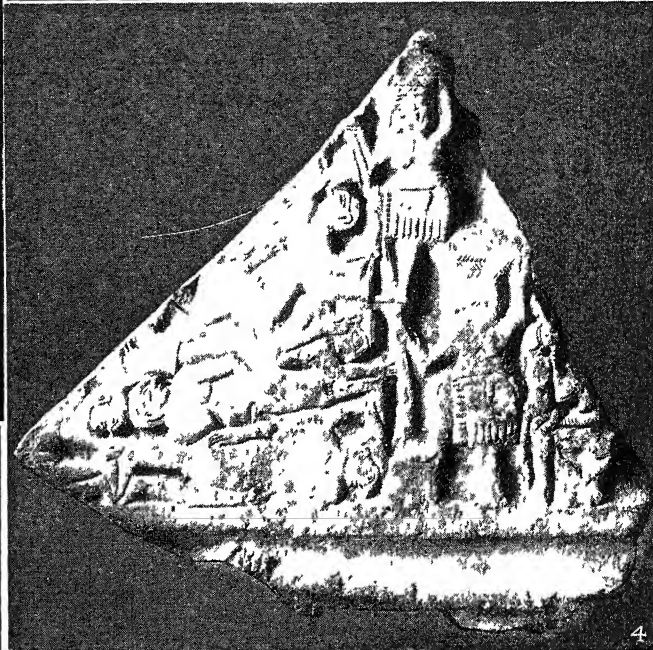
Who founded these cities? Probably they were all or nearly all of Sumerian origin, though some, e.g. Akkad, were founded by Semitic Babylonians. Ruling over several



2



3



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7

1. Letter cut in clay and baked. 2. Cylinder, right, impression of this obtained by passing the cylinder-seal over soft clay. 3. Boundary-stone with texts referring to ownership of an estate, c. 1000 B.C. 4. Relief

depicting burial of the dead and priests heaping an earth mound. 5. Babylonian map of the world. 6. Huge stone lion standing over prostrate man. 7. Bronze doorstep with inscription of Nebuchadrezzar II, 604-561 B.C.

BABYLONIA: ANCIENT MANNERS AND CUSTOMS REVEALED BY RELICS OF ITS EARLY ART

and his successor Karaindash II (c. 1380 B.C.) and the above-mentioned kings of Egypt.

The dynasty of Pashc (c. 1184-1052 B.C.) produced but one great ruler, Nebuchadrezzar (wrongly spelt Nebuchadnezzar), who lived about 1140 B.C. and revived the declining fortunes of Babylonia. He won victories over the Elamites, restored to Babylon its tutelary god Marduk (Merodach), and also added territory in Mesopotamia, Syria, and elsewhere to the country which he inherited. His attempt, however, to regain the suzerainty over Assyria was a failure, for the Assyrian king Ashurreshishi drove him back just as he had begun the invasion of Assyria. But he handed on to his successor a larger Babylonia than he had received from his predecessor. Those who followed him, however, were weak, and failed to retain it, and under the Assyrian king Tiglath-pileser I (c. 1100 B.C.) Babylonia became a mere dependency of Assyria.

Decline of the Empire

Of the fifth, sixth, seventh, eighth, and ninth dynasties little more is known than the names of some of the kings, but it may be said that during the eighth dynasty (c. 1000-800 B.C.) power gradually passed over to Assyria. In 727 B.C. Tiglath-pileser IV of Assyria became king of Babylon under the name of Pul, just as his son and successor, Shalmaneser V, called himself Wulai; Ashurbanipal, Kandalenu and Sargon II, Shakkanak of Babylonia. When, however, in 625 B.C. Nabopolassar, though a Chaldaean, became king of Babylonia by the help of the Medes, with whom he had fought against Assyria, an era of unsurpassed brilliance for what has been called Neo-Babylonia, or Chaldaean Babylonia, set in.

His son and successor Nebuchadrezzar II (604-562 B.C.) raised the empire to its highest pitch of power and prestige, and it may be said that neither Assyria nor Babylonia did more at any time for the promotion of culture and of the native religion. The inscriptions of his reign which survive are silent with regard to the madness and degradation of this king (Dan. 4). It must be remembered, however, that Babylonian and Assyrian rulers never record incidents discreditable to themselves or their country. It was this king who, in 606 B.C., besieged and conquered Jerusalem, and in 586 B.C. set fire to the city, including the temple, carrying away the best part of the population to his own country.

Under the rule of his successors this great empire gradually collapsed. The last king of all, Nabonidus (555-539 B.C.), was a man of fine character, absorbed in intellectual pursuits and religious exercises. Neither a warrior nor a man of affairs, he spent most of his time at a quiet retreat called Tema. His country was invaded by the great Persian king Cyrus. The Babylonian army, under the king's son and agent Belsharutsur, the Belshazzar of the Bible (Dan. 5), made a show of defence, but was soon vanquished by the Persians, who entered Babylon unopposed, indeed welcomed by the bulk of the inhabitants as deliverers.

Thus Babylon, once the envy of the world, fell in 538 B.C. It fell never to rise again, just as in 607 B.C. its rival, Assyria, vanished for ever from the page of history. Almost immediately after his great victory Cyrus allowed, encouraged, and aided the Jews of Babylon to return to their mother-country, and many availed themselves of the privilege, as is recorded in the books of Ezra and Nehemiah.

CULTURE AND RELIGION. The culture of Assyria being derived almost entirely from Babylonia, there is no need to repeat the details, but a few points of difference may be noted. First, there are hardly any survivals of Babylonian statues, owing to clay having been the only material used. Secondly, as Babylonian art is very old, some specimens going back as far as 4000 B.C., much of it is exceedingly simple, though often more forcible than the bulk of the more elaborate work of later years. Thirdly, the walls of Babylonian palaces and temples were covered with bricks, not with slabs, as in Assyria; consequently the decoration consisted in colouring, enamelling, and the drawing of coloured pictures.

In early times the chief god of Babylonia was Ellil or Bel, called later Merodach, who exercised a softer and more intellectual influence than Ashur, the counterpart of the Greek Arès and Roman Mars, to whom the militarism and ferocity of the Assyrians were due. The magicians were almost as important as the priests, especially in its early history. The pantheon of Babylonia was more extensive than that of Assyria, and finally, in Babylonia it was the priest who became king, not, as in Assyria, the king who became priest.

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Babylonian Captivity. Name applied to the period after the deportation of Jews from Jerusalem to Babylon by Nebuchadrezzar II, 586-538 B.C. It has also been used to describe the anti-papal court set up at Avignon in opposition to Rome during the Great Schism, 1378-1417.

Babylonish Garment. Term introduced into Coverdale's version of the siege of Jericho (Joshua 7). The R.V. has "mantle."

Linen and woollen fabrics, dyed and patterned, sometimes of purple with gold embroidery, were among the earliest exports from Babylonia to the Mediterranean. The trade, developed by the Phoenicians (Ezek. 27), contributed greatly to Roman luxury. The elder Cato sold his Babylonish mantle as too splendid for personal wear.

Baca. The name, probably allegorical, of a valley mentioned in Psalm 84, rendered in the R.V. valley of weeping.

Bacau or BAKAU. A town of Rumania, in Moldavia. Situated on the Bistritza, just above its junction with the river Sereth, it is served both by the main railway through Bukarest into the Bukovina and Poland, and by a branch line to Piatra along the Bistritza valley; two main roads go from the town into Transylvania over the Carpathians, one N.W. through Piatra, and the other S.W. It trades in timber, and has petroleum wells. Pop. 31,264.

Baccarat. Gambling card game much played in France, but illegal in the United Kingdom. Probably introduced from Italy into France in the reign of Charles VIII, the origin of the name is unknown. Many of the well-known baccarat clubs in Paris have their own particular rules for playing. The most usual is between a banker and other players termed punters. In baccarat chemin de fer each player is

banker in turn. In all forms the banker uses several packs of cards, shuffled together, and proceeds to deal two cards to each player and two cards to the table (himself). Each round is termed a coup. The value of the cards is reckoned as one for the ace, two for the 2, three for the 3, and so on up to the 9; the 10 and court cards count 0. The maximum number of points is nine.

The banker receives money from all the punters who hold below the value of his own two cards, and also from those players holding over nine, and pays those who are nearer nine than himself. Thus, should the banker have a 6 and 2 (=8), all punters holding less than this number and those holding over nine would pay. In the event of a punter and the banker holding cards totalling the same amount, it is a tie and the stake remains down for the next coup. The game is sometimes played with the option of a third card being given. A punter holding a 3 and a 10 or court card (=0) may demand another card, in the hope of drawing a 6 or a 5. The first two cards are dealt face downwards, the third being exposed.

Baccarat. Town of France, in the department of Meurthe-et-Moselle. On the river Meurthe, 15 m. S.E. of Lunéville, it is noted for its extensive glass works, established in 1765.

Bacchae. Play by Euripides. Produced after his death, it was written at the court of King Archelaus, in Macedonia, where the wild Bacchic ritual was very prevalent. Pentheus, king of Thebes, prohibits the celebration of the Dionysia by the Bacchae, among whom is his own mother Agave, and, dressed as a woman, mounts a tree to watch a ceremony. The enraged god sets the Bacchae on his track, and, mistaken for a wild animal, he is torn to pieces by his mother and her companions.

Bacchiadae OR **BACCHIDAE.** Aristocratic Corinthian family. Having overthrown the original monarchy, they formed an exclusive oligarchy, which ruled the city from 747 to 657 B.C., one of their number being chosen as president. Under them Corinth flourished greatly, sent out colonies to Corcyra and Syracuse, and became a considerable naval power. Their rule came to an end with Cypselus, one of the family, who made himself "tyrant" or absolute ruler.

Bacchides. Comedy by Plautus. A play of intrigue, which takes its name from two girls named Bacchis. The chief char-

acter is one of the tricky and unscrupulous slaves who figure so largely in the comedies of Plautus and Terence. The Greek original by Menander contains the well-known "Whom the gods love, die young," which is also introduced by Plautus. *Pron.* Bak-i-deez.

Bacchus. In Greek and Roman mythology, name of the god of wine and fertility, better known among the Greeks as Dionysus. According to legend, he was the son of Zeus by Semele, daughter of Cadmus, king of Thebes. Hera, jealous of her lord's love for a mortal, persuaded Semele to ask him to appear before her in all his majesty. He unwillingly consented, and when he approached in thunder



Bacchus. God of wine and fertility in Greek and Roman mythology
British Museum

and lightning, Semele was consumed by the flames. A son, Bacchus, prematurely born, was saved by Zeus, who sewed him up in his thigh.

After a second birth the infant was handed over to the nymphs of Mt. Nysa. On reaching manhood he travelled in the East as far as India, teaching the cultivation of the vine and other fruits of the earth to the inhabitants. He returned to Europe by way of Thrace, whence his worship spread to various parts of Greece. On the island of Naxos he found Ariadne, deserted by Theseus, and made her his wife. After his divinity had become fully established, he went down into Hades in quest of his mother, and took her up to Olympus.

Bacchus is frequently represented as attended by frenzied women called Bacchae, Bacchantes,

Maenades, and Thyiades, all meaning frantic; Pan, Silenus, and satyrs were also among his followers. The god was of benevolent disposition, but merciless to those who opposed his worship. The Bacchic rites (Bacchanalia) at Rome, where Bacchus had become identified with his Roman counterpart, Liber, were celebrated with such excesses that they were strictly forbidden in 186 B.C. by a special decree of the senate. Bacchus was also identified with the Egyptian god Osiris. Besides the Greater and Lesser Dionysia the cycle of his festivals included the Lenaea (Gr. *lénos*, vat), a country festival crowned by the drinking of new wine, and the Anthesteria, or three day festival of flowers, at which pitchers of wine were drunk for a wager, and offerings made to the dead. *See* Dionysia.

Bacchylides (fl. c. 467 B.C.). Greek lyric poet. Included in the Alexandrian canon of the nine great lyricists, he was the nephew of Simonides. Born at Ceos, he spent some time at the court of Hiero, tyrant of Syracuse, and lived for many years in exile in Peloponnesus. Only about 100 lines of his poems were known until 1896, when a papyrus containing 20 more or less complete odes were discovered in Egypt and sent to the British Museum. In 1897 F. G. Kenyon published the first edition of these odes. *Consult* Bacchylides, ed. R. C. Jebb, 1905. *Pron.* Bak-killy-deez.

Bach, ALEXANDER ANTON STEPHAN, BARON VON (1813-93). Austrian politician. Born at Loosdorf, Austria, Jan. 4, 1813, he became a lawyer and public official. In 1848 he was active in promoting the revolutionary movement, but soon afterwards joined the party in power and was made minister of justice and then minister of the interior. In the latter position he aimed, but failed, to centralise the system of government. He left office in 1859, and until 1867 was ambassador at Rome. He died Nov. 12, 1893.

Bach, JOHANN CHRISTIAN (1735-82). German musician. Born at Leipzig, he was the eleventh son of Johann Sebastian Bach. After studying at Berlin and in Italy, he was organist at Milan Cathedral, 1760-62, and spent the rest of his life in England. He was master of music to Queen Charlotte and gave concerts in London which were popular for 20 years. His sacred and operatic compositions were greatly admired. He died Jan. 1, 1782. *Consult* Life, C. Terry, 1930.

J. S. BACH: HIS LIFE AND HIS MUSIC

W. J. Turner, Author of *Music and Life*, etc

This article by a distinguished critic, who wrote many books on musical subjects, gives the main facts about the life and work of the great German composer, Johann Sebastian Bach (1685-1750).

See also Music; Oratorio

Johann Sebastian Bach was born at Eisenach, in Saxony, on March 21, 1685—the same year as Handel, the younger Scarlatti, Berkeley, and Gay—of a long line of musicians of Thüringia. He was an orthodox Lutheran, which means that he was laodicean rather than extremist in his religious attitude, and as an artist he was not in sympathy with the puritan pietists of his time. A student at S Michael's convent at Lüneburg in 1703 he became a violinist in the household of Duke Johann Ernst, a brother of the duke of Weimar. Here he came into contact chiefly with Italian music, which was as popular and universal in German courts of that time as German music was in England during the nineteenth century. In 1704, at the age of 19, he became organist of the new (Protestant) church at Arnstadt. While there he obtained a four-weeks' leave-of-absence to visit the famous organist and composer Buxtehude at Lübeck, but he stayed away nearly four months, and over this and other matters had trouble with his employers. In 1707 he obtained his second appointment as organist at S Blasius, Mühlhausen, where on Oct. 17 he married his cousin Maria Barbara Bach. A year later he became court organist to Duke Wilhelm of Weimar, where he spent nine years and composed most of his organ works and many cantatas; his son, Karl Philipp Emanuel, was born there in 1714.

Court Appointment at Weimar

In 1720 his wife died and he married an accomplished musician, Anna Magdalena Wülkens, in whose hand many of his manuscripts were written. The first half of *The Well-Tempered Clavier* and many of his suites were composed about this time. In 1723 he was installed as cantor of the Thomasschule at Leipzig and remained there until his death, July 28, 1750.

Bach's eldest son, Wilhelm Friedmann, was born in 1710; both he and his brother Karl became famous musicians, as did his youngest son, Johann Christian, who became music master to the queen of England and is known as the English Bach.

Bach was a man of very independent character but shrewd and sensible enough to keep his employers as long as it suited him, no mean achievement amid the fanatical religious and political factions of his age. His genius as a musician was hardly realized during his lifetime, although his technical competence could never have been in question, and his personality gained him some powerful friends.

From excessive neglect during the 18th and early 19th centuries, Bach's music at the end of the 19th century moved to and has ever since remained at the other extreme. This is partly due to a reaction against Wagner and to a natural historical development. The historical approach to the work of creative artists, though necessary, can be dangerous because it may lead to a misinterpretation of their work, due to an



Joh. Seb. Bach.

inevitable unconscious bias for or against a particular development in the technique of the art. Thus Rutland Boughton in his lively books on Bach, especially the one published in 1930, is so ardent a supporter of polyphony as against homophony that he is unjust to the music of both Mozart and Beethoven and he considers that Bach was the crest of the last and final wave of polyphony, of which the ripest and greatest period was centuries earlier. It might be truer to say that the opposition found by some

in these two musical forms is in itself almost an essential method of their continuous development. Most of the talented composers of the present day use more polyphony than did Beethoven's contemporaries, but so did Beethoven himself. The fact is that in every art there is a perpetual oscillation from one side to another in technique, and a similarly perpetual struggle by the greatest masters to achieve a richer and more satisfying synthesis. The distinction between polyphony (the combining of tones in horizontal lines) and homophony (the combining of tones vertically in blocks) is itself artificial, for the vertical blocks themselves have to move horizontally to make music; but the mind cannot take in too much at a time or move at too fast a rate and it separates its paths only in order to reunite them, since at each separation the component ways are made clearer and more distinct and one or the other may be lost sight of temporarily to musical advantage.

Clarity of Bach's Music

The great vogue which Bach's music has enjoyed, especially in England, during the 20th century is partly due to the fact that nowadays the construction of his music is much easier to grasp than that of some others because its basic form is more clearly audible. The polyphony of contemporaries such as Bartok and Hindemith is far more complicated by dint of its harmonic enrichment due to the post-Beethoven development of homophony. Popular audiences at the Promenade concerts and the immense public that listens to music over the radio can delight in Bach because they can hear all the musical strands being deftly and intricately woven together. In fact Bach's music has to them the clarity of 18th century painting, in which all the objects which the painter represents are clearly and distinctly recognizable however vivid and contrasted their colours and no matter how subtle and complex the harmony of their forms. But the higher artistic virtues of musician and of painter are apt to be overlooked or missed in this simple immediate delight in mere clear recognition of what they are doing.

Thus Bach's feeblest and most uninspired pieces are apt to be enjoyed as much as are his finest works because what is commonly enjoyed is hearing so distinctly all the wheels going round. Fugues

(which resist turning into music as obstinately as sonnets into poetry, but which as mere skeletons or frameworks are abominably easy to make) seduce the novice because of their formal clarity and intelligibility, and to the average music-listener Bach means fugues. This is true in spite of the popularity of the S. Matthew Passion and the B minor Mass.

Harvey Grace's valuable book, *The Organ Works of Bach*, reveals how very poor and unsatisfactory many of Bach's fugues are, and those who wish to develop their understanding of fugal composition should certainly study that book—especially as many of the best of Bach's organ works are less known and more difficult to obtain on gramophone records than inferior ones. Rarely does the playing of these works do them full justice. The modern organ is a debased instrument, much inferior musically to 18th and early 19th century organs. The same may be said of modern organists. Irregular rhythm is one of their besetting vices. So in spite of Bach's immense and secure reputation as one of the supreme musicians of the world, it is still rare to hear any of his works performed adequately, and a great many of his finest achievements in choral and instrumental music remain virtually unknown. Perhaps Bach's outstanding virtues as a composer—apart from the sublimity of his ideas—are his gifts of invention and construction. He is as intellectual a composer as Mozart and Beethoven, and, like them, has a tremendous power of architectonic design and creative stamina.

Bach's original compositions, apart from his numerous arrangements, fill 52 large volumes in the authoritative edition of the *Bachgesellschaft*, which, beginning its labours in 1850, completed them in 1899. They include a High Mass in B Minor, 4 smaller Masses, a Magnificat and other works to Latin words; 3 Passions, of which the Matthew and John are the chief, with a Funeral Ode, the music of which is partially the same as that of a Mark Passion now lost; 202 church cantatas, some also styled oratorios; 21 secular cantatas; many independent solo songs, chiefly to religious words; 29 concertos and other orchestral pieces; and a vast quantity of music for organ, for clavier (among which the collection of 48 preludes and fugues in all the keys, known as *The Well-Tempered Clavier*,

the 18 suites and partitas, the Goldberg variations, and the Italian concerto stand prominent), and for stringed instruments, notably six sonatas for violin and clavier, and six for violin solo.

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Bach, KARL PHILIPP EMANUEL (1714-88). German musician and composer. Born at Weimar, March



K. P. E. Bach,
German musician

14, 1714, the third son of Johann Sebastian Bach, he studied law, but turned his attention to music and settled in Berlin. Before 1740 he had become a musician in the household of Frederick the Great, whose flute solos he accompanied. In 1768 he removed to Hamburg, where he remained as director of church music or Kapellmeister until his death, Dec. 14, 1788. His numerous compositions, which are historically valuable as illustrating the early development of the sonata and the symphony, include 210 solo pieces for the piano, 52 concertos, and many songs. He composed 22 Passions and several oratorios, notably *The Israelites in the Desert*. Mozart and Beethoven valued Bach's genius highly.

Bachelor. Word of uncertain origin, usually with an implied sense of inferiority. It was early used for the holder of a *baccalaria*, perhaps derived from *bacca*, late Latin for *vacca* (cow), which seems originally to have been cattle-land belonging to an inferior vassal. The term has been applied to ecclesiastics at the beginning of their career, to knights of the lowest grade, to subordinate members of a trade guild or city company, to students who have taken the lowest university degree, and to unmarried men. The last-named were penalised in ancient Sparta, Greece, and Rome, and occasionally during the Middle Ages. In England an Act was passed in 1695 taxing bachelors, to raise money for the French war.

Bachelors' Club. London social club. Founded in 1881, its house is 11 and 12, Hamilton Place, W. It has about 1,000 members, who pay an entrance fee of 30 and an annual

subscription of 10 guineas. During the Second Great War, its premises being requisitioned, the club was housed by the St. James's Club.

Bachka. Former prov. of Yugoslavia, now the autonomous region of Voivodina. Prior to 1918 Bachka was part of Hungary, being incorporated into Yugoslavia after the First Great War. Occupied by Hungarian forces in April, 1941 it was liberated in May, 1945, and granted autonomous government, Sept. 6, 1945.

Bachmut or **BAKHMOU**. Town of Ukraine S.S.R. in Donetsk prov. On an affluent of the Donetz, 130 m. E. of Dnepropetrovsk, it possesses soap factories and beds of rock-salt, and is an important market for cattle.

Bacillus (Latin, a small rod). Name of a micro-organism in form like a rod. Bacilli consist of cylindrical cells that multiply by division and by the formation of endogenous spores. See *Bacteriology*.

Back, SIR GEORGE (1796-1878). British explorer. Born at Stockport, Cheshire, Nov. 6, 1796, he entered the navy in 1808, and in 1818 went out with Sir John Franklin to the Arctic. He more than once saved the lives of his companions, and also did good service during Franklin's exploration of the Mac-



Sir George Back,
British explorer

kenzie river. In 1833 Back went out to find Captain Ross, and was away for two years, discovering the Great Fish or Back river. Between his journeys he served in the navy, and in 1835 attained the rank of captain. His fourth and last expedition to the Arctic was made in 1836, the hardships he encountered making him an invalid for many years. He was knighted in 1839, became an admiral in 1857, and died June 23, 1878. He wrote accounts of his expeditions.

Backbone. Name for the vertebrae or bones of the spine. See *Spinal Column*.

Backergunge. Coastal div. of E. Bengal, Pakistan. It forms part of the fertile delta of the Ganges and Brahmaputra, and contains a portion of the jungle region of the Sunderbunds. Backergunge, the former capital, is ruined and Barisal has taken its place. Of the pop., three-quarters are Mahomedans, the rest being Hindus: five-sixths of the people pursue agriculture, growing three rice crops annually.

Back Flash. The technical term for the rush of flame from the breech of a gun when it is opened after firing. Back flash was almost unknown when gunpowder was the propellant universally employed, but has caused considerable trouble since modern smokeless powders became general, owing to the residual products of the latter containing much carbon monoxide. Some of this gas in a highly heated state remains in the gun-barrel, and ignites on coming in contact with the oxygen of the air when the breech is opened. The effect is greatly intensified if a wind is blowing into the muzzle.

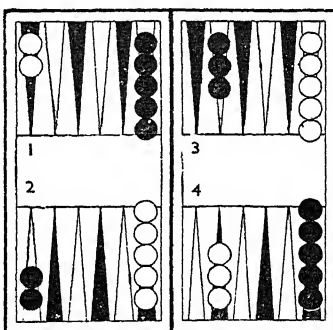
Serious accidents have occurred through the back flash igniting charges near the guns, and crews have been poisoned through the carbon monoxide escaping into turrets and casemates. To eliminate this noxious gas, most modern naval guns are fitted with devices for flushing out the barrel with compressed air before opening the breech. See Ballistics.

Backgammon or **TRIC-TRAC.** A game, referred to by Chaucer as tables, played on a special board by two persons. Each player has 15 men, one taking black, the other white. A dice box and two dice for each player are necessary. A backgammon board is square, usually of wood lined with leather, divided into halves, each surrounded with a raised wall or border. Each player has an outer and an inner or home table, each containing six points marked alternately in black and white, and board and men are arranged as indicated in the diagram. The points on the inner tables farthest from the bar or dividing partition are known as the ace points, the next as the deuce points, followed by the trois, quatre, cinque, and six points, the last coming next to the bar or partition. Points on the outer tables are similarly named, but begin at the dividing partition, the ace in the outer tables generally being designated the bar point.

Each player begins by casting a single die, the one who throws higher having the right to start and, if he chooses, to appropriate the numbers thrown by himself and his opponent as his first move. All subsequent throws are made with two dice. The men are moved from point to point, according to the throws of the dice made by the players alternately. White moves from black's inner to black's outer table, and from this through his own outer to his own inner table; all black's moves must be made in

the opposite direction. A player may move any of his men a number of points corresponding to the numbers on the dice thrown by him, providing the point to which such move would bring him is not blocked by two or more of his opponent's men. Or he may move two men, providing each moves to a position in accord with the number on each die.

In case there should be only a single man on a point it is called a blot, and when an opponent throws a number which would bring one of his men to that position, it is called a hit, and the man so hit is taken up and must start again from his opponent's inner table. Also, until the owner can throw a number corresponding to a vacant space or blot to which it can be moved, the



Backgammon. 1. Ace-point of black's home or inner table. 2. Ace-point of white's home or inner table. 3. Bar-point of black's outer table. 4. Bar-point of white's outer table

play of his other men must be suspended. A player getting two men on a given point, that point is said to be "made"; the men in this position being free from capture and impeding at the same time the advance of those of his opponent. When either player has successfully brought all his own men into his own home table, he proceeds to "bear them off," i.e. remove them from the board. For every throw he may remove a man if there is one in a corresponding position. The player who first succeeds in clearing all his men from the board wins the game. Russian backgammon has many points of difference from the above. Consult *Complete Backgammon*, L. W. Richard, 1938.

Backhaus, WILHELM (b. 1884). German pianist. Born at Leipzig, March 26, 1884, he studied at Leipzig and Frankfurt-on-Main, and in 1900 made his first concert

appearances with a repertoire of over 300 works. His extraordinary technique won him immediate success. In 1905 he was appointed professor of the piano at the Royal College of Music, Manchester, but in the same year, having won the Rubinstein prize of 5,000 francs (£200) for piano playing, he gave up his chair and devoted himself to concert tours. He was one of the few youthful prodigies who fulfilled their promise.

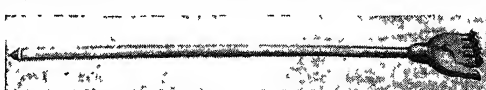
Backhouse, SIR ROGER ROLAND CHARLES (1878-1939). British sailor. Born Nov. 24, 1878, he served throughout the First Great War and commanded the Lion, flagship of the 1st battle cruiser squadron of the Grand Fleet, in 1916. Director of Naval Ordnance, 1920-22, he was put in command of the 3rd battle squadron, Atlantic Fleet, in 1926. From 1928 to 1932 he was Third Sea Lord and controller of the Navy; knighted 1933, he became commander-in-chief Home Fleet in 1935. Appointed First Sea Lord and chief of naval staff in 1938, he was promoted admiral of the fleet in 1939, retiring the same year and dying July 15.

Backing Winds. Winds whose direction of change is opposite to that of the hands of a watch, e.g. from E., through N., to N.W. or W. The opposite change is called veering. When the wind in Britain backs, it usually denotes that the centre of a cyclone is passing from W. to E. to the S. of the point of observation. See Buys-Ballot's Law; Meteorology.

Backlash. In machinery, looseness in a transmission gear due to wear, which allows a part to move without moving the part with which it is connected. For example, backlash in the steering-gear of a motor-car makes it possible to rotate the hand-wheel slightly either way without moving the road-wheels.

Back River. Alternative name for the Great Fish (q.v.) river of Canada, discovered by Sir G. Back.

Backscratcher. Toilet implement. Its main use is suggested by its name, but it was also used as a kind of comb for the immense



Backscratcher. From a specimen made of horn

coiffures of the time of George III. It was some 18 ins. in length, made of cane, horn, whalebone, or wood, topped with a hand of carved ivory or other material.

Back to Methuselah. Play cycle by Bernard Shaw, described by its author as a "metabiological pentateuch." It is in five acts ranging through time from the Garden of Eden to A.D. 31,920. Evolution here represents the experiments of the Life Force to perfect an instrument for its purposes. The argument is that unless mankind is prepared to aid the Life Force human beings will be discarded as were the prehistoric monsters. Performed by the Theatre Guild of New York, April, 1922, the play was produced in five parts, Oct. 9-13, 1923, at the Birmingham Repertory Theatre, and at the Court Theatre, London, Feb. 18-22, 1924. It was revived in 1928. Gwen Ffrangcon-Davies played Eve, and Edith Evans the Serpent and the She-Ancient.

Backwell, EDWARD (d. 1683). English merchant and banker, often regarded as the founder of the modern banking system. Belonging to an old family of Somerset, he became a goldsmith in London before 1650, his shop with the sign of the unicorn being in Exchange Alley, off Lombard Street. Like other goldsmiths, he was entrusted with money by his customers, which he began to lend out to merchants, receiving a higher rate of interest than he paid. He had transactions with Cromwell and Charles II. In 1672, the latter owed Backwell nearly £300,000. Backwell was M.P. for Wendover 1679 and 1681, and is mentioned by Pepys.



E. Backwell,
English merchant

Bacold. Town of the Philippine Islands. It stands on the W. coast of Negros island, opposite Iloilo on Panay. It is a port for the sugar industry, though the harbour is too shallow for large vessels. The pop., trebled in 20 years, was 57,703 in 1940.

Bacon. Carcass of the pig when cured, salted, or otherwise treated. The food value of bacon is high, yielding 2,685 calories per lb. as compared with rump steak, which yields 1,110. Under the Agricultural Marketing Act, 1931, schemes were prepared for regulating the marketing of pigs and pig products in Great Britain. The U.K. total supplies of bacon and hams were stabilised at the average of the period 1925-1930, i.e. 10,670,000 cwt., the home industry

being allotted a quota based on the volume of bacon it could undertake to produce, and the remainder being allocated among the various exporting countries. Factories were established for the production of Wiltshire cut sides cured on the Danish principle—known as tank cure, as against the old method of dry salt cure. These sides are produced by sawing the carcass after removing the head and cutting off the leg to the knee joint down the middle, removing the viscera, backbone, blade bone, aitch bone, leaf fat, tender loin, and kidney. After grading they are ready for curing. The fleshy part of the sides receives injections of brine under pressure, after which the sides are placed in tanks containing pickle, where they remain for 96 hours, finally to drain for 48 hours before marketing.

A small trade in dry salt cured bacon is centred mainly round the Midlands and Cumberland districts. Hams will keep over 12 months. When a smoked product is required, bacon and hams are subjected to the action of smoke for three days.

Bacón. Native town of Luzon, Philippine Islands. On the Gulf of Albay, 20 m. S.E. of Albay, it lies in a volcanic but fertile region. The neighbouring volcano, Bacón or Pocdol, is 4,667 ft. high; near it is a remarkable hot spring, the reddish waters of which issue from an elliptical crater. Their temperature is 70° C. Pop. 15,000.

Bacon, DELLA SALTER (1811-59), An American author. She was born at Tallmadge, Ohio, Feb. 2, 1811, of a New England Puritan family, wrote *Tales of the Puritans*, 1837, and became a popular lecturer on history. Inspired by the idea that Bacon wrote the works attributed to Shakespeare, she came to England in 1853, visited Stratford, and launched her theory in *Putnam's Monthly*, Jan., 1856. Her Philosophy of the Plays of Shakespeare Unfolded followed in 1857, with a non-committal introduction by Hawthorne. Later her mind gave way, and she died at Hartford, Conn., Sept. 2, 1859. See *Bacon-Shakespeare Controversy*; consult *Life*, Th. Bacon, 1888.

Bacon, SIR FRANCIS, VISCOUNT ST. ALBANS (1561-1626). English jurist and philosopher. Born at York House, London, Jan. 22, 1561, he was the younger son of Sir Nicholas Bacon, afterwards lord keeper of the great seal, by his second wife, Ann Cooke, and nephew of Sir William Cecil, afterwards Lord Burghley. He entered

Trinity College, Cambridge, in 1573, leaving in 1575. Accepting in 1576 a mission in the service of Sir Amyas



Statue of Francis
Bacon, jurist and
philosopher, at St.
Michael's near
St. Albans

Paulet, newly accredited as ambassador to France, he went to Paris, and he had been there three years when his father died. Thrown upon his own resources, Bacon returned and studied at Gray's Inn, being admitted a barrister in 1582.

About 1591 Bacon made the acquaintance of the earl of Essex (*q.v.*). His ambition was to be attorney-general, and Essex supported his suit, but Bacon had incurred the displeasure of Queen Elizabeth on a question of supplies, and the office was bestowed upon Sir Edward Coke. In 1597 there appeared a prospect of his marriage with the wealthy Lady Hatton, but it fell through, and in 1598 Bacon was arrested for debt. Knighted by James I, he eagerly engaged in political intrigues. In 1606 he married Alice Barnham. Made solicitor-general in 1607, he was appointed attorney-general in 1613, a privy councillor in 1616, lord keeper of the great seal in 1617, and lord chancellor in 1618, when he was created Baron Verulam. He was created Viscount St. Albans in 1620. In 1621 charges of corruption and bribery were preferred against Bacon, but he refused to defend himself, although he confessed his regret. A heavy fine was inflicted, and for a while he was lodged in the Tower. The king remitting his fine, he retired



Francis Bacon at the age of ten.
From a portrait bust at Gorhambury,
Hertfordshire

from public life. He died April 9, 1626, and was buried at St Michael's church, St. Albans.

The first edition of Bacon's *Essays* was published in 1597. Originally ten in number, embracing, among others, the themes Of Study, Of Discourse, Of Regimen of Health, Of Honour and Reputation, they were expanded to 58 in the last edition, issued in 1625. He speaks of them as being the most current of his works, "for that, as it seems, they come home to men's business and bosoms." In 1605



After Van Somer

appeared *The Two Bookes of the Proficience and Advancement of Learning Divine and Humane*.

Bacon is regarded by men of science of our day as the originator of the modern school of experimental research, an honour great enough to modify undue detracting of the man in other respects. It is worth recalling that there is a clause in his will in which he bequeaths his name to posterity "after some time be past over." Bacon held that "man is the servant and interpreter of Nature," and argued against the schoolmen's deductive method of reasoning then current, expounding with rare facility and keen perception in his *Novum Organum*, 1620, a treatise upon the conduct of the understanding in systems of inquiry, a true and patient understanding and interrogation of Nature through phenomena and facts. "There is much ground," he says, "for hoping that there are still laid up in the womb of Nature many secrets of excellent use, having no affinity or parallelism with anything that is now known, but lying entirely out of the beat of the imagination, which have not yet been found out."

His *New Atlantis* composed before the *Novum Organum* appeared posthumously in 1627 as an appendix to the *Sylva Sylvarum*. In the first he indicates in allegory a model college under the title of Solomon's House or the College of the Six Dayes Works. Groups of individuals were to be employed in bringing in knowledge to the effecting of things. There were to be preparations and instruments; furnaces, perfume-houses, engine-houses, and the like. Some were to sail into foreign countries; some to try new experiments; while others were to formulate things of use and practice for man's life and knowledge. It was in the *New Atlantis* that telephonic communication was anticipated—"means to convey sounds in trunks and pipes to great distance and in curved pipes."

It is held that the *New Philosophy*, of which this was a fragment, had its earliest practical fruit in England in the establishment of the Royal Society of London for the Improvement of Natural Knowledge. The nucleus of that body had existed before 1662, the date of its incorporation, but Bacon's systems of philosophical inquiry had permeated the minds of the men of learning of the period—Evelyn, Wren, Boyle, Wallis, Oldenburg, and others, so that they sought, first and foremost, for ways and means of materialising Bacon's plans.

Bacon's treatise *De Augmentis Scientiarum* appeared in 1623. He had been working continuously since 1605 on this amplification of the original *Advancement of Learning*, and refers to it as "a book I think will live and be a citizen of the world." It forms the prefatory portion of the completed work, the *Great Instauration*, of which the *Novum Organum* was the second part, and presents a summary of existing human knowledge, with criticisms of its deficiencies.

The eloquent prophet of a new era, Bacon supplied the impulse which broke with medieval preconceptions, pointing the way to progress in philosophy and the sciences; these were to be no longer unsettled and speculative, but fixed on the solid foundation of well-considered experience. The weakening of the bonds or scholasticism was foretold: the putting aside of hypothetical systems, the substitution of direct thinking for contentious syllogistic methods. The diversion of human thought into such novel channels, untrammelled by authority was relatively slow, though the leaven of the open mind of scientific research was a vivifying influence silently at work

It would be incorrect to describe Bacon as a man of science, according to the essential meaning of the term. Certainly, as Herschel observes, he was a reformer of science, but his actual contributions to the stock of physical truth were small. Rather should he be regarded as one of the originators of the whole existing plan, design, and fabric of science, whose position is for ever assured.

T. E. James

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Bacon, JOHN MACKENZIE (1846-1904). British aeronaut. Born June 19, 1846, son of a Berkshire clergy-



J. M. Bacon,
British aeronaut

man, he was educated at Trinity College, Cambridge, and was for some years curate at Harston, Cambridge, and at Coldash and Shaw, Berkshire. From early life he was interested in astronomy and kindred sciences. In Aug., 1888, he first went up in a balloon, and in 1902 he was the second person to cross the Irish Channel in that manner, his journeys being used for experiments in wireless telegraphy and for photographing the bottom of the sea. He died at Coldash, Dec. 26, 1904. He was the author of *By Land and Sky*, 1900; and *The Dominion of the Air*, 1902. *Consult* *The Record of an Aeronaut*, G. Bacon 1907.

Bacon, SIR NICHOLAS (1509-79). English statesman, father of Francis Bacon. Born of a Suffolk family, and educated at Corpus Christi College, Cambridge, he was called to the bar in 1533, and in 1537 nominated solicitor to the court of augmentations. He received a share of the



Sir Nicholas Bacon,
English statesman
Zuccherò

monastic lands at the dissolution of the religious houses and in 1546 was appointed attorney of the court of wards and liveries—an office which, in spite of his Protestantism, he retained during the reign of Mary. After the accession of Elizabeth in 1558, he was made lord keeper of the great seal and a privy councillor, and was knighted. Queen Elizabeth frequently visited him at his

mansion at Gorbamby, near St. Albans. He died Feb. 20, 1579, and was buried in S. Paul's Cathedral. His son Nicholas was made a baronet in 1611, and his descendants in the baronetcy rank as the premier baronets of England.

Bacon, SIR REGINALD HUGH SPENCER (1863-1947). British sailor. A clergyman's son, he entered the training ship Britannia in 1874. In the Benin expedition of 1897 he was chief of the intelligence department, winning the D.S.O. He conducted the first submarine trials and was director of naval ordnance and torpedoes.

In 1914 he went to France as colonel of the Royal Marines. In 1915, he was appointed vice-admiral in command of the Dover Patrol, a post he held until Jan., 1918, when he was made controller of the munitions inventions department at the admiralty. He was knighted in 1916. In 1932 he published an account of the operations of the Dover Patrol. He wrote a *Life of Earl Jellicoe*, 1936; *Modern Naval Strategy*, 1940. He died June 9, 1947.

Bacon, ROGER (c.1214-94). English scientist and philosopher, called Doctor Admirabilis. He was born at Ilchester, Somersetshire, studied theology at Oxford and Paris, entered the Franciscan order, settled at Oxford, and began experimental researches into the facts of nature, devoting special attention to alchemy and optics. He invented the magnifying glass and an explosive compound of charcoal, sulphur, and saltpetre which anticipated modern gunpowder.



Roger Bacon,
English scientist

Bacon's associates, according to later writers, accused him of dealing in black magic, and the general of the Franciscan order removed him to Paris, where he was kept under restraint for eight years, forbidden intercourse with the outside world, and denied writing materials, books, or instruments. When Clement IV, who as Guy de Foulques was papal legate in England and had heard of Bacon's works, was elected pope in 1265, he wrote asking for a copy. Bacon drew up his *Opus Majus*, an encyclopedia of the then known sciences and sent it, with two of his other works, by the hand of his favourite pupil, John of London. Their

effect was such that Bacon regained a comparative measure of freedom.

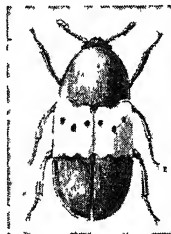
On the death of Clement IV, Jerome of Ascoli, the general of the Franciscan order, denounced Bacon, forbade the reading of his works, and imprisoned him in 1278, a sentence confirmed by Pope Nicolas III. When Jerome himself became pope as Nicolas IV in 1288, Bacon sent him a treatise on the means of warding off the infirmities of old age. Whether as a reward or impelled by remorse, Jerome released Bacon, who returned to Oxford, where he wrote in 1292 his *Compendium Studii Theologiae*. He urged the study of Greek, Latin, and Arabic, of mathematics, physical science, and moral philosophy, and declared the possibility of steam vessels, telescopes, microscopes, and other later inventions. The *Opus Majus* has been edited by J. H. Bridges, 1897-1900, and the *Compendium* by A. G. Little, 1911. *Consult Life*, F. W. Woodruff, 1938.

Bacon Beetle. Species of beetle belonging to the genus *Dermestes*. Rather small in size, only one-third of an inch, it takes up its abode in bacon and other dry food, as well as in museum specimens. Most of the mischief is done by the larvae, which are thickly covered with brushes of stiff hair. *See* Beetle.

Bacon-Shakespeare Controversy. Dispute over the theory that Francis Bacon wrote the plays and poems commonly attributed to William Shakespeare. This

theory, which dates from 1856, is based on (1) the assumption that William Shakespeare, of Stratford-on-Avon, was illiterate; (2) parallelisms between the acknowledged works of Bacon and those published in 1623 as the works of William Shakespeare, of Stratford-on-Avon; and (3) the fact that no authoritative Shakespearian text exists. The disputants include orthodox Shakespearians, Baconians, and anti-Stratfordians, i.e. those who, while of open mind on the Baconian theory, contend that William Shakespeare, of Stratford, was not the author of the plays and poems known as Shakespeare's.

The controversy, which is singularly barren of any acceptable result, has had a recent revival, and



Bacon Beetle

the posthumous book of Dr. W. S. Melsome, of Bath, *The Bacon-Shakespeare Anatomy* (1945), rides parallelism to death. "Anybody with some critical apprehension of literary quality must feel that the mind expressed in Bacon's works is not the mind expressed in Shakespeare's," writes R. L. Miegroz after a study of Melsome, and that judgement sums up the whole sterile controversy to date. *See* Shakespeare.

BACTERIOLOGY: STUDY OF MICROBES

John Drew, M.D.

An account of the progress made in this relatively young branch of science and of its application to the study of diseases. Articles on various diseases, Tuberculosis, Typhoid, etc., should be consulted, also those on Health, Infant Mortality, etc.

Bacteriology is the science concerned with the study of those forms of microscopic life known as bacteria, microbes, or germs. It is an independent science because, although the bacteria are generally placed in the vegetable kingdom, they probably occupy an intermediate position, and form a link, between the true plants and the animal kingdom. In number they far surpass the combined total of all other forms of life, plant and animal, inhabiting this earth, and in their ubiquity, adaptability, and simplicity of structure, they are unequalled by either plants or animals. Their activities for good and for evil exert a profound and continuous influence upon all other forms of earth life, and

because of their influence the science of bacteriology has important applications in medicine, veterinary medicine, agriculture, and industry.

The science of bacteriology is still, relatively, in its infancy; because it is less than a century since the researches of Pasteur, Koch, Cohn, and their associates established the existence of bacteria as living entities, and focused human attention upon them as causal agents of disease in man, animals, and plants. As far back as 1700, the great Dutch microscopist, Anthony van Leeuwenhoek, working with microscopes of his own manufacture, had seen living objects "one thousand times smaller than the eye of a big louse" in drops of rain water and of vege-

table infusions; but it was a long time before his observations were confirmed, and it was not until Müller's work was published in 1786 that biologists began the *systematic* study of bacterial forms. The systematic study of bacteria had to wait until Robert Koch, around 1878, devised the necessary technique for making them easily visible by staining them with various dyes, and demonstrated that some of them could be made to grow and multiply on artificial foodstuffs in the laboratory, although, before his discoveries, the work of Pasteur, Davaine, Klebs, and others had established the association of bacteria with certain diseased states of man and animals.

We know that bacteria are abundant in all parts of our planet, except in the Polar regions and in the central areas of large desert regions. They abound in the soil, they populate water both fresh and salt, they are carried high into the atmosphere by wind and other agencies, and they are constantly present on the body surfaces, and in the natural body cavities of men, animals, and plants. Wherever they are found, they have these features in common: simplicity of structure, microscopic size, biological and metabolic activity, and a capacity for adaptation to changing environment.

Morphology of Bacteria

A bacterium consists of a minute speck of protoplasm, enclosed in a delicate, semi-rigid, semi-permeable envelope, or membrane. There is no organized nucleus in the cell, a fact that distinguishes the bacterial cell from other unicellular forms of life; and all bacteria reproduce asexually by a simple fission of the cell. Although the structure of bacteria is so simple, it nevertheless permits of three basic forms, the coccus, the bacillus, and the spirillum. The coccil form has the shape of a minute sphere, in which any one diameter of the cell is approximately equal to any other. Many cocci are true spheres; others are spheroids, while some are ovoidal in shape. According to the way in which they group themselves in growth agglomerations, they are known as staphylococci (irregular clusters), streptococci (chains), diplococci (pairs), tetrads (fours), and sarcinae (packets of eight cocci).

The bacillary form is that of a minute, rigid cylinder, in which the long axis of the cell is always definitely bigger than the transverse axis. The bacilli show wide

variations in length and girth within the limits of the basic cylindrical form, and while some are so short and plump that they are described as coccoid, others are so long and thin that they are described as filamentous. A few species normally imitate the streptococci in their tendency to grow together in chains of varying length, and these are known as streptobacilli.

Spirilla Large and Small

The spirilla constitute a morphological group whose members are either short, curved cylindrical organisms, or elongated, non-flexuous cells showing a spiral structure. The members of the first sub-group are known as vibrios, while the remaining types of spirilla are known as spirochaetes. The spirilla show wide variations in size from the large *Cristispira* to the small vibrio, often called the comma bacillus, that is the causal agent of Asiatic cholera; and equally wide variations in the pitch of the spiral from the saprophytic *Saprosira*, with wide, loose curves, to the pathogenic *Leptospira*, with a screw-like structure.

The division of bacteria, based upon their biological activities, into saprophytes, or free-living forms, and pathogens, or disease-producing forms, has been of value in the systematic study of bacteria, particularly in relation to the study of plant and animal pathogens. This division is not, however, constant because there are many borderline species, the biological behaviour of which is determined by their immediate environment. The bulk of the known bacteria consists of saprophytic species that normally derive their nourishment from the decomposition of dead plant and animal tissues, and utilise dead organic and inorganic compounds as sources of energy. Obligate saprophytes comprise those bacteria that are biologically incapable of living in, or attacking, living plant and animal tissues.

A relatively small number of species derive their essential nourishment from the living tissues of plants and animals. These are the obligate pathogens. Between these biological extremes are many species of facultative bacteria, some of which are normally free-living but can become pathogens under certain conditions, while others are naturally pathogens but can lead a free-living existence under suitable conditions. This grouping bears no

relation to the grouping based upon bacterial morphology. The obligate saprophytes include cocci, bacilli, vibrios, and spirochaetes, and there are obligate pathogenic representatives of each of these basic forms.

The small size of the bacterial cell has made necessary the employment of a particular arbitrary scale of measurement, the basic unit of which is the micron, commonly designated by the Greek letter μ . A micron is the equivalent of 1/1,000 of a millimetre, or, approximately, 1/25,000 of an inch. Bacterial cells can vary so much in size within their microscopic limits, however, depending upon their environmental conditions, that measurements are only valid for constant and controlled environments.

Laboratory Cultures

The largest bacterial cells are far too small to be seen as individual objects by the unaided human eye, but they become visible as aggregates when they grow as compact clusters, or colonies, containing millions of individual cells, on the surface, or in the depths, of various artificial foodstuffs—technically known as media—in the laboratory. The fact that many bacteria can be cultivated on suitable media in the laboratory has been of enormous value to humanity, because it has enabled bacteriologists to isolate many of the plant and animal pathogens from the lesions of disease for which they were responsible and, by careful study of their growth and metabolic activities, to identify them and determine their powers of resistance to natural and to artificial antagonistic influences. In the absence of laboratory cultivation, very few bacteria could be identified with certainty, and the successful treatment of many bacterial diseases of man, animals, and plants has been made possible only by the study of laboratory cultures.

The individual bacterial cell usually requires to be magnified about one thousand times before the human eye can see it clearly, and this magnification is obtainable only by the use of a microscope fitted with an oil-immersion lens, so called because the lens can function only when it is immersed in a film of an oil which is translucent and has the same refractive index as glass. Bacteria are, of course, subject to the same laws that govern optical measurements in general, and from the

operation of these laws we know that any object smaller than half the wavelength of the light employed to illumine it cannot be resolved by any system of lenses. The optical limits of resolution of the modern microscope, using ordinary daylight or electric light as the illuminant, lie between 0.1 and 0.2 of a micron. Some of the bacteria that cause disease in man approach this limit in size; and many serious diseases of plants and animals are caused by much smaller agents, the so-called ultra-microscopic viruses, which will never be visible to us through an ordinary microscope. By using an illuminant with a smaller wavelength than that of ordinary visual light we can, however, render these agents visible to the camera, and so, by the use of ultra-violet rays and of electrons, we can obtain photographs of objects with a diameter as small as one millimicron—i.e. 1/1,000 of a micron.

Method of Multiplication

The biological activities of bacteria are numerous and diverse, and are of decisive importance in distinguishing between saprophytes and pathogens. Bacteria multiply by a process of simple fission, the cell splitting either transversely or longitudinally into two descendant cells. Under optimum laboratory conditions, multiplication may occur with great rapidity, a fresh generation appearing every 20-30 minutes, although it is probable that multiplication never approaches this rate under natural conditions.

Bacteria assimilate food in solution by diffusion through the cell membrane, and they therefore require an adequate supply of water. Desiccation is rapidly fatal to the vegetative cells of most bacteria, and this observation has been applied to the preservation of human foods, notably dried fruits and vegetables, to protect them from bacterial decomposition. They obtain their food through the agency of the ferments, or enzymes, which they make, and with which they are able to break down complex and insoluble compounds into simpler and soluble substances. Many of the disease processes they cause in the plant and animal body are the result of the action of their enzymes upon the tissues of the host. The number of different enzymes made by bacteria is very large, but they can all be placed in a number of well-defined classes, the most important of which are the

saccharolytic, or starch-splitting, and the proteolytic, or protein-splitting, enzymes.

Some bacteria manufacture pigments as an integral part of their biological activity, and these pigments—which cover almost the whole range of the visible spectrum—are of value in the identification of the different chromogenic (pigment-producing) species. Other bacteria emit light as a biological activity. A common requirement of both chromogenic and luminescent bacteria is an adequate supply of free atmospheric oxygen. Oxygen is required for all bacterial respiration, but bacteria can be divided into two groups according to the way in which they naturally obtain and utilise the oxygen they require. These groups are known as the aerobes and the anaerobes. Aerobic bacteria obtain their oxygen from the atmosphere, and the obligate aerobes can only live and multiply in the presence of free atmospheric oxygen. Anaerobic bacteria cannot tolerate free atmospheric oxygen; they obtain their oxygen from the decomposition of compounds containing it, and the obligate anaerobes cannot multiply in the presence of even a trace of free oxygen. There are, however, many bacteria that are facultative in their oxygen requirements and can live and multiply under either aerobic or anaerobic conditions, although they prefer the one or the other.

Self-Propelling Bacteria

Most of the known bacteria are incapable of independent movement, and these bacteria are dependent upon passive transport for their dispersal. Some bacteria are, however, capable of independent movement, in a fluid medium only. These bacteria owe their motility to the possession of minute threads of protoplasm, technically known as flagella, which project from the cell and by their vigorous lashing movements propel it through a fluid medium. Bacterial motility is not a constant possession; it may be lost with the loss of the flagella, and regained with their reproduction. There are only a few motile species of cocci known; but many of the bacilli, and all the known spirilla, are naturally motile organisms.

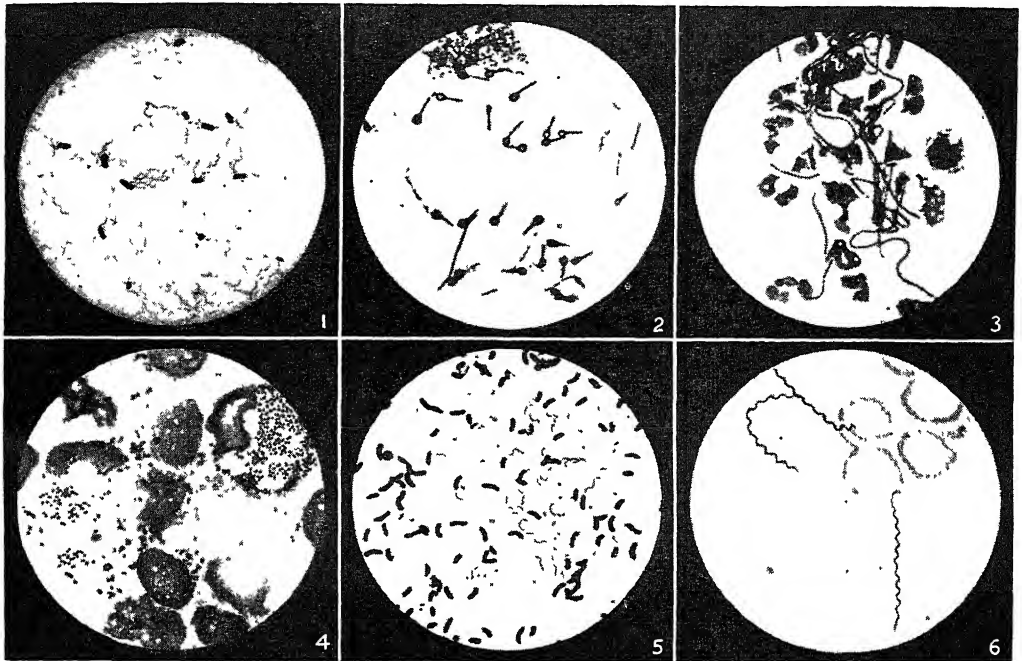
For the efficient operation of their biological activities, bacteria require an adequate food supply in the form of nutrient solutions, oxygen either free or combined, an even temperature that differs

with the different species, a favourable reaction of the surrounding medium, and protection from the natural inhibitory agencies of sunlight, severe cold, and desiccation. The optimum temperature for any given species usually approximates closely to the average temperature of its natural habitat. Thus the obligate human pathogens have an optimum temperature around 37.5° C., which is the normal temperature of the human body, and therefore laboratory cultures of these germs must be grown at this temperature in special heat-regulated containers known as bacterial incubators. Bacteria that normally live in fresh water have an optimum temperature around 20° C.; many of these saprophytic water species will not grow at 37.5° C., and so, in the bacteriological analysis of drinking water supplies, duplicate cultures must be incubated at 37.5° C. and at 20° C. There is a group of heat-tolerant bacteria, the thermophilic bacteria, whose activities are sometimes responsible for the spontaneous firing of hay-ricks, whose optimum temperature is around 70° C.

Reactions to Environment

Some bacteria have a wide range of tolerance to acid and alkaline reactions of their environment. Some, the acidophilic bacteria, can tolerate high concentrations of acid and cannot live and multiply in an alkaline environment; others require an alkaline environment and cannot tolerate a trace of acid. Most of the pathogenic bacteria are restricted in their reaction range, and many will only live and multiply in an environment that is either neutral or very close to neutrality. This factor of the optimum reaction of the medium, which differs among the different species, has to be carefully controlled in the laboratory in order to obtain satisfactory cultures of bacteria on artificial media. Many bacteria can adapt themselves rapidly, however, to moderate changes in the reaction of their environment, providing that the change is gradual; and it is probable therefore that under natural free-living conditions this factor is not so decisive as it is under artificial living conditions.

Apart from their capacity to adapt themselves to changes in the reaction of their environment, bacteria exhibit remarkable powers of adaptation to cold, to drying, to the action of antagonistic chemical agencies, and to many



Bacteriology. Photomicrographs of six pathogenic bacteria. 1. Typhoid bacilli showing thread-like flagella, the organs of motility. 2. Tetanus bacilli with spores at the ends of the rods. 3. Long and short chains of streptococci, bacteria found in blood poisoning, abscesses, etc. 4. Meningococci occurring in pus from the brain. 5. Cholera vibrios, each short curved organism having a single flagellum. 6. Spirilla of relapsing fever; the round objects are red blood cells

other influences that bear upon them. In some species, special defensive mechanisms in the form of spores and capsules are developed in order to enable the germs to adapt themselves to adverse conditions that would be lethal to the vegetative cell. A bacterial spore is a small oval, ovoid, or spherical body, with a thick and extremely resistant envelope, that forms inside the parent cell, and in which is concentrated the living substance and the vital activities of the cell. When the spore is mature, the relic of the parent cell disintegrates. Bacterial spores are the most resistant form of life on this planet of which we have any knowledge. Some of them can withstand boiling for several hours, and all of them show a greatly increased resistance to chemical disinfectants and to the natural sterilising agencies of sunlight and desiccation, compared with the resistance of the vegetative cells. Strong sunlight is rapidly fatal to the vegetative cells of most bacteria by virtue of its content of ultra-violet rays, which explains why desert regions in tropical latitudes are so free from germs that are injurious to man, but bacterial spores can withstand it for much longer exposures. For-

tunately, the majority of spore-forming bacteria are saprophytes; but the causal agents of anthrax (a serious disease of man and animals), of tetanus, or lock-jaw, and of gas-gangrene, are sporing bacilli, and the resistance of their spores necessitates special precautions in the laboratory investigation of these germs and of the cases of human and animal disease for which they are responsible. When the bacterial spore is placed in a favourable environment, such as the tissues of the human body, it germinates to produce a single vegetative cell, which then multiplies and makes its specific enzymes and poisons. It must be emphasised that bacterial spore formation is not a method of reproduction like the spore formation of the moulds and other fungi, but a purely defensive mechanism that does not provide any multiplication of the germ. The spore-forming bacteria are confined to the bacilli; no coccus or spirillum is known that forms a spore.

A bacterial capsule is a mucoid, or gelatinous, envelope of varying thickness that is secreted by the cell as a protection against antagonistic influences of a particular kind. Many human pathogens form capsules when they have

invaded the body tissues as a defence against the reactions of the tissues, although capsule-formation does not occur when they are cultivated on artificial media outside the body. The pneumococcus, the causal agent of most cases of acute lobar pneumonia in man, is a classical example of a capsulated bacterium; and before the discovery of the sulphonamides, it was the presence of its capsule that made the pneumococcus so difficult a germ to destroy in the human body.

It is natural that the harmful activities of certain bacteria in the human body should cause our attention to be focused upon the pathogenic bacteria; but the ravages of bacteria among the lower animals and among plants are, in their total, almost as dangerous to the continued existence of the human race as their attacks upon human individuals and communities. Man is dependent for his existence upon his flocks and herds of food and draught animals, and his crops of wild and cultivated food plants. His food animals, in their turn, are dependent upon vegetable foods. When the staple crop of a community fails, that community is at once

threatened with famine, and famine is inevitably associated with pestilence, because the individual's resistance is lowered by his lack of nutrition and he becomes more susceptible to the attack of pathogenic bacteria. Bacteria cause many serious economic diseases among man's food and draught animals—tuberculosis, plague, anthrax, and glanders, to name only a few of the diseases they cause. Bacteria can attack the growing plant and destroy it, although their ravages are not so serious as those of the microscopic fungi among growing plants. They attack and spoil our stored foods; the annual economic loss throughout the world caused among our stored foods by bacterial activity is colossal. The putrefaction of meat, the soft rots of fruit and vegetables, and the souring of milk are examples of harm. The applications of bacteriology to agriculture are therefore of importance to us as individuals, and in their influence upon the continued existence and progress of the human race they are as important as the applications of bacteriology to medicine, especially when it is realized that without the beneficent activities of certain species of bacteria there would be no vegetable life, and therefore no animal life, as we know them upon this planet.

Nitrogen-fixing Bacteria

Nitrogen is an essential constituent of all plant tissues, but plants cannot utilise it in its free, uncombined state. The original store of combined nitrogen, in the form of nitrates, in the soil was long ago exhausted by the demands of the primeval plants, except in certain restricted localities like the Chilean saltpetre deposits. Certain species of bacteria, however, are able to extract nitrogen from the inexhaustible store of that element in the earth's atmosphere and fix it in the soil in a form in which plants can utilise it. There are two groups of these nitrogen-fixing bacteria, the free-living, nitrifying bacilli of Winogradsky, that live in the uppermost layers of the soil, and the root-nodule bacteria that work inside the nodules occurring on the roots of leguminous plants like peas, beans, vetches, clover, and lupins. It is the nitrogen-fixing activity of these bacteria that explains why a crop of clover enriches arable land, especially if the clover is harrowed, or cross-ploughed, into the superficial soil when the crop is mature.

Many other saprophytic bacteria exhibit activities that are beneficial, but man has only comparatively recently begun to study them and to seek to control their activities for his own welfare. The iron bacteria derive their energy from the decomposition of iron compounds: and the oxidation of iron, not always a beneficent activity when the erosion of domestic or industrial iron work is concerned, may be caused by bacterial action. The sulphur bacteria attack compounds containing sulphur; and the phenol bacteria attack carbolic acid and other phenols and so play an important rôle in ridding the soil of these sterilising chemicals. The decomposition of dead animal and vegetable matter is due to bacterial activity, and bacteria are the agents that enable the gardener to make compost from the waste greenstuff of the garden. It is generally accepted that the fertility and richness of a soil is proportionate to its content of humus, and, as we have seen, bacteria are the chief agents in the production of humus.

Microbes in the Body

The bacteria that cause human disease are not imbued with any malign purpose; their invasion of the human body is accidental and incidental to the contacts that occur between them and man; but they have become adapted in the course of evolution to live and multiply in the body tissues, and in the course of their life cycle their biological and metabolic activities evoke reactions on the part of the host's tissues that manifest themselves in the symptoms and signs of disease. The pathogenic bacteria are relatively rare inhabitants of the human body compared with the enormous number of obligate and facultative saprophytes that the healthy human body normally harbours. The human skin, the bowels, and the natural external body cavities each harbour a bacterial population that is constant in kind, but variable in number, in the healthy individual, although different individuals show differences in the composition of their bacterial flora.

The bacteria that cause disease enter the human body either by way of the natural cavities that open to the external world, or through breaches in the continuity of the skin or of the membranes (mucous membranes) lining the body cavities. It is doubtful whether any bacterium can penetrate the intact human skin, but

some can pass through the protective barrier of the skin by way of the natural channels—the hair follicles and the ducts of the sweat and of the grease glands—that traverse the skin. This passage may be assisted by unhealthy conditions of the skin; by defective personal hygiene resulting in the clogging of the pores by dirt or cosmetics; by occupational hazards; and by derangements of the functions of the glands in the skin. The common boil, an infection usually due to the germ known as *staphylococcus*, generally starts as an invasion of a hair follicle, into which the germ is pushed by the friction of the clothing, by scratching, or by the use of contaminated cosmetics.

Why We Lay the Dust

Bacteria that enter the body by way of the respiratory tract are drawn into the tract in the air we breathe. They are so light that tiny currents of air suffice to keep them suspended for considerable periods of time, but under the influence of gravity they are deposited from perfectly still air, although they may be suspended again by small air currents. The chief reason for the water-cart, that tours our town streets in dry and dusty weather, is to damp down and wash into the drains the germs that are present in the street dust and so prevent them from becoming suspended in the air that we breathe. Similarly, in hospital wards, factories, theatres, and all places where people congregate indoors, oiling or damping the floors is a valuable protection against infections that enter the human body by way of the respiratory passages. Most of these bacteria are expelled into the air from the respiratory passages of people who are themselves infected, but are not too ill to continue at work or to take their pleasure; of people who are incubating an infection, or of people who are carriers of particular germs. During the acts of coughing, sneezing, and spitting, large numbers of pathogenic germs may be projected into the atmosphere, if the ejected matter is not caught in a handkerchief, or in one's hand.

Bacteria that enter the body by way of the alimentary tract are introduced in the foods that we eat and the fluids that we drink. Their immediate fate after we have swallowed them depends upon the state of our gastric digestion at the time we swallow them, because there are very few bacteria that can survive even a short

exposure to the hydrochloric acid that is normally present in the human stomach at certain times. The state of the individual's "acid gastric barrier" may therefore be the decisive factor that determines whether or no he will contract typhoid fever, or dysentery, or an attack of bacterial food poisoning.

Bacteria that enter the body by way of the genital passages are usually introduced during the act of coitus, and are the causal agents of the group of diseases that are consequently known as the venereal diseases. The human urinary and genital tracts are separate in the female, and in the male except for a common duct that traverses the penis. Infections of the male urinary tract (bladder, ureters, and kidneys) may therefore occur as extensions of a primary genital infection, although they mostly take origin from some other focus within the body, from which the germs are carried to the urinary tract in the circulating blood, or from which they invade the tract by direct extension through connecting tissues. Infections of the female urinary tract may be introduced from the external world, but mostly they invade the tract from foci elsewhere in the body.

How Infection is Carried

The ways in which bacteria spread among the members of human communities are determined by the biological characters of the particular germs, and by their exits from the body of the sick person or the carrier. As a general rule, a bacterium that enters the human body by a particular tract is expelled from the body by way of that tract. For example, the causal agent of typhoid fever, *E. typhosus*, enters the body by the alimentary tract and is expelled from it in the motions. The pneumococcus enters the body by way of the respiratory tract and is expelled from it in droplets of mucoid or purulent matter, or in sputum, by the acts of coughing, sneezing, and spitting. The gonococcus enters the body by way of the genital tract and is expelled from it in the abnormal discharges that exude from the tract during the disease. The staphylococcus that enters the body through the skin is expelled from it in the exudates that are discharged through breaches in the skin. If the bacterium is capable of living for a time outside the human body, then articles upon which it is deposited may passively transmit infection to susceptible people who handle

them, eat them, or otherwise make contact with them. All such articles are grouped under the heading of fomites, and the term can include every article of household, school, and workshop use, all foodstuffs that are eaten uncooked or without further domestic cooking, and fluids such as milk and water. When these are not treated to destroy their bacterial content.

Insect Dissemination

This method of spread, where some inanimate substance serves as the link in the transmission of infection from man to man, is known as indirect contact spread. It is a means of dissemination of hardy bacteria like *M. tuberculosis*, *C. diphtheriae*, and the streptococcus that causes scarlet fever and childbirth fever; but, in most cases, it is the human being, acting as a carrier, who is responsible for these infections. In addition to direct and indirect contact between humans, insects play an important part in the spread of certain bacterial diseases among human communities. In some cases the insect acts simply as a mechanical vector of the germ, as, for example, the common housefly, which contaminates the sticky pads of its feet with the germs of typhoid fever and bacillary dysentery, when it feeds on exposed human excrement deposited by carriers of those germs, and then conveys them to our food. In other cases, the insect acts as a biological vector of the germ, which enters and multiplies within its body and sometimes destroys the insect in the process. Insects that act as biological vectors are all predators on man, subsisting upon human blood as their source of nutriment, and it is during the act of feeding that they transmit the germ they carry to their human host, either by direct inoculation into the host's blood, or indirectly by the inunction of their excrement into the human skin. Thus, the rat flea transmits the germ of bubonic plague from the rat to man; the body louse transmits the germ of typhus fever from man to man; and a mosquito transmits the virus of yellow fever from man to man. These are three examples of many similar relations between the insect world and mankind. Predatory insects may also be the indirect cause of bacterial infections in man, because the irritation that frequently results from their bites impels the victim to scratch or rub the irritating spot and so, if he happens to be carrying pathogenic germs on his fingers

—and such germs are frequently carried for varying periods of time under the finger-nails even by cleanly persons—introduce them into his body through the puncture wound made by the insect.

Pathogenic bacteria can therefore be spread through human communities in a variety of ways, and it is fortunate that the healthy human body is naturally equipped to deal effectively with most of the pathogens that are encountered in the ordinary course of life, and that recognizable infection is rare compared with the frequency of the contacts between pathogenic germs and the human body. Where such infections occur, the science of bacteriology has provided, and is providing, us with knowledge which saves human life, reduces disability, and protects the individual and the community from the spread of disease.

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Bacteriostatic. Word used to describe a substance which prevents sepsis by stopping the growth of bacteria, *e.g.* penicillin.

Bactria or **BACTRIANA**. In ancient geography, a tract of country comprising the N. slope of the Hindu Kush as far as the Oxus river (Amu Daria). It corresponds nearly to the district of Balk (*q.v.*), which has preserved the name, in the modern Afghanistan. According to tradition, Zarathustra or Zoroaster, the founder of the ancient Persian religion, lived and taught here in the time of a legendary King Vishtaspa (c. 1000 B.C.). Its fertility led to early occupation by Iranian peasantry, doubtless preceded by pre-Aryan peoples, who were in constant contact with Altaian nomads on the N. side of the river. For ages it was held by petty chieftains, one of whom may have sent an embassy to the Assyrian Shalmaneser III (c. 858 B.C.) with presents of Bactrian camels.

Cyrus made it a satrapy of the Achaemenian empire (c. 538 B.C.) Alexander the Great overran it in

328 B.C., and established Greek garrisons. After a brief Seleucid domination, Diodotus, the Greek satrap of the capital city Bactra (Balk), rebelled and founded the Greco-Bactrian kingdom (c. 250 B.C.). A splendid series of coins elucidates its history, a 20-stater of Eucratides being the largest gold coin of antiquity. This general usurped the throne (c. 160 B.C.), while his overlord, Demetrius, who had established a new capital S. of the Hindu Kush at Sagala, was advancing down the Kabul valley.

The occupation of the Punjab was completed under his greatest descendant, Menander, the Milinda of Buddhist chronicles. An irruption of the Sakas or eastern Scythians (c. 139 B.C.) submerged this easternmost outpost of Greek culture. They were followed a century later by the Yueh-chi, who founded the Indo-Scythic Kushan empire. Hellenic influences passed permanently into the Buddhist art of India and Chinese Turkistan.

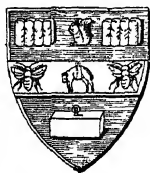
Bactris. Genus of slender S. American palms. Growing on swampy land, river banks, and the



Bactris. Slender S. American palm

sea coast, they are mostly small, more like reeds than trees, their stems being furnished with sharp spines. They grow in clumps, owing to their habit of throwing up numerous suckers from the roots. One species (*B. minor*) has a stem little more than 12 ft. in length and about an inch thick, from which are made the walking-sticks known as Tobago canes. *B. maraja*, which grows on the Amazon, attains a height of 50 ft. It produces bluish black succulent fruits which, though acid, have an agreeable flavour and form the basis of a kind of wine.

Bacup. Mun. bor. and market town of Lancashire, England. It stands on the river Irwell, near its source, 20 m. N. of Manchester by railway. Bacup was incorporated in 1882, and has cotton-spinning and power-loom weaving mills, shoemaking, felt-making, and



Bacup arms

calico-printing works, iron-foundries, and dye-works; there are coal mines and stone quarries in the neighbourhood.

The corporation owns the markets, the library and baths, parks and recreation grounds, and cemetery. The Hempsteads estate was presented to the corporation by J. H. Maden, an ex-mayor. New waterworks were completed in 1910 and a light rly. was opened in the same year. Occupying an elevated position near by is Broad clough Dykes, an ancient camp. Market day, Wed. Pop. 20,606.

Badaga. Primitive tribe in the Nilgiri hills. S. India. Of medium height, and very long-headed, they engage in agriculture and cultivate bearded wheat, barley, and native cereals, but some have abandoned cultivation for the more profitable pursuit of daily labour. They speak a Dravidian dialect and are now Hinduised, with some animism due to contact with other hill tribes.

Badagry. Harbour and district of Nigeria. The district is inhabited by the Egbados, whose chief town is Iaro. The harbour is situated on the lagoon running from Porto Novo (Dahomey) to Lagos, about 38 m. W. of the latter city, and has a small trade in palm kernels. Founded by Benin colonists, it was the starting-place of the expedition of Richard and John Lander in 1830. It has long been superseded as a port by Lagos. The district has an area of 1,167 sq. m. and a pop. of 92,000.

Badajoz. Largest province of Spain, in Estremadura. It borders on Portugal, the Guadiana forming part of the boundary, and is traversed by that river and the Madrid-Lisbon Rly. It produces cattle, goats, wax, silk, wool, pork olive oil, and cork. The capital is Badajoz. Area, 8,349 sq. m. Pop. 776,282.

Badajoz (anc. *Pax Augusta*). A city and episc. see of Spain, capital of Badajoz prov. On the Guadiana, here crossed by a fine granite bridge, 315 m. by rly. S.W. of Madrid, it is close to the Portuguese frontier. It has a cathedral, a Moorish castle, an arsenal, and various manufactures, and carries on a transit trade with Portugal. A frontier fortress it has been several times besieged, notably by the Portuguese in 1660; by the Allies in the War of the Spanish Succession, 1705; by the French, 1808-9 and 1811; and three times by the British (see below). It fell to Gen. Franco's forces in the civil war, Aug. 15, 1936. Pop. 71,648.

Badajoz, BRITISH SIEGES OF. Operations against the French during the Peninsular War. In Feb., 1811, this important frontier fortress was surrendered by the Spaniards to the French, and in May and June two attempts at recovery by the British failed.

Both Wellington and the enemy then made more elaborate preparations. On March 17, 1812, the British began to construct siege works, although on the 19th a sortie from Badajoz, and the wet weather, greatly hindered operations. The batteries were got into position and opened fire on the 25th when the Picurina, a fortified hill just outside the town but within its fortifications, was carried by assault. The British made good use of the captured hill, and early in April two breaches had been made in the southern walls. It was decided to assault on the 6th, after a third had been opened.

Under cover of night one division on the right was sent against the castle, the walls of which were from 18 ft. to 24 ft. high; on the left another division was to attack a bastion to the N., while elsewhere the Portuguese and others were to deliver feigned assaults, the Portuguese on the E. side, where the river Guadiana flowed along the walls. In the centre two storming parties of 500 men each were to assault the breaches.

Here every horror awaited the men as they plunged into the ditch. When more than 2,000 men had fallen in an area not 100 yds. sq., the others were called off. Meanwhile Picton's division, having crossed the little river Rivillas, had assailed the castle walls. At the first attempt they were beaten back; but a dash against the lower part of the wall gave them entrance and the castle was won. Another success was gained at the bastion of St. Vincent, and some men here were the first to enter the town itself.

The breaches of Badajoz were abandoned, and on the next day it was formally surrendered. The British lost nearly 5,000 men, and took a terrible revenge in the pillage of the town. Napier's description of this siege (Peninsular War, vol. iv) is one of his finest pieces of descriptive writing. Consult also History of the Peninsular War, C. W. C. Oman, 1902-11.

Badakshan. Afghan province, bounded S. by the Hindu Kush and N. by the Amu Daria (Oxus). It includes the region of Wakhan. The pop. consists mainly of Tadzhiks, who speak Persian, though Turki

is also spoken. Its capital is Faizabad. A mountainous land, drained by the Kokcha, it is famous for its ruby mines and cliffs of lapis lazuli.

Badakshansk-Gorno. Autonomous province of Tadzhik S.S.R., Russia. It lies in the Pamirs, in the S. of the republic, towards Afghanistan. Chief town: Khorog.

Badalona (anc. *Baetulo*). Coast town of Spain, in the prov. of Barcelona. On the Mediterranean, 10 m. by rly. N.E. of Barcelona, of which city it is really a suburb, it is at the mouth of the river Besos, here crossed by a stone bridge carrying the rly. It has boat-building yards, large glass-works, sugar and petroleum refineries, cotton and woollen and biscuit factories. There are orange groves in the district, which produces grain and fruit. Pop. 49,697.

Badbury Rings. Prehistoric stronghold $4\frac{1}{2}$ m. N.W. of Wimborne, Dorset (Badda's burgh). The hill is 327 ft. high, surmounted by two earthen ramparts separated by a broad berm or pathway from an earthwork, perhaps later, lower down. Water was supplied by a pond. The old road to Old Sarum (Ackling Dyke) was used by the Romans. Its identification with the Mount Badon of King Arthur's last battle in 520 is discredited.

Baddeley, ANGELA (b. 1904). English actress. She was born in London, July 14, 1904, and made her first appearance at the Old Vic in 1915 as the little duke of York in Richard III. She subsequently covered a wide range in serious drama and comedy, as exemplified by the parts of Jenny Diver in *The Beggar's Opera*, 1920-23; Kathryn Howard in *The Rose without a Thorn*, 1932; and Miss Prue in *Love for Love*, 1943. She played opposite Emlyn Williams in his plays *Night Must Fall*, 1935; *The Light of Heart*, 1940; and *The Morning Star*, 1941. She married Glen Byam Shaw.

Her sister Hermione was born at Broseley, Shropshire, Nov. 13, 1906, and made her first appearance on the London stage in *La Boite à Joujou* at the Court Theatre, 1918. Possessing an outstanding talent for burlesque, she specialised in revue, and in 1923 joined *The Co-Optimists* (g.v.). Later she was a mainstay of intimate or sophisticated revues at the Little and other theatres.

Baddeley, ROBERT (1732-94). English comedian. After serving as cook to Foote and valet to a traveller, he became an actor at Drury Lane Theatre, and was

the original Moses in Sheridan's comedy *The School for Scandal*. His wife, Sophia (1745-86), was an actress and singer. Baddeley left money to found a home for decayed actors and to provide the Drury Lane company with wine and cake on Twelfth Night. He died Nov. 20, 1794.

Badderlocks. Rock seaweed of the Phaeophyceae (olive-brown seaweeds) found on the shores of the British Isles, N. Europe, and Iceland. It has a short stem and a long membranous frond, which sometimes reaches as much as 10 ft., and of which the midrib is edible. Honeyware is an alternative name.

Baden. Fourth largest state of Germany. Formerly a grand duchy within the German empire, it became a republic in Nov., 1918, and held that status under Hitler's Nazi regime. It is bounded N. by Bavaria and Hesse-Darmstadt, E. by Württemberg, S. by Switzerland, and separated from France by the Rhine on the W. Shaped like a hatchet, it is broadest in the S., including most of the Black Forest or Schwarzwald. The area is 5,820 sq. m., and the pre-war pop. was 2,518,103.

The mts. of the Black Forest rise 5,000 ft., are carved into gloriously wooded valleys, and drained by tributaries of the Rhine. The rivers Neckar and Main also cross the state. Constance is the only considerable lake. The fertile valleys produce grain, flax, hemp, and vines. Tobacco is grown extensively. The mineral wealth comprises coal, iron, lead, zinc, gypsum, peat, clay, and in smaller quantities gold, silver, and copper. Baden has celebrated mineral springs. Many industries depend on timber: saw-milling, paper-making, wood-carving. Clocks and watches are made, and Pforzheim is a centre of silverware and jewelry. Mannheim specialises in rly. and motor manufacture. The Black Forest folk have traditional skill in making toys and trinkets.

Over half the people are Roman Catholics. Freiburg is an archiepiscopal see; it has also a university, as has Heidelberg. Karlsruhe is the capital (189,850), Mannheim the most populous city (283,801); both have technical universities. Other places are Baden-Baden, Bruchsal, Ettlingen, Villingen, and Lörrach. The rlys. belong to the state.

Baden was taken from the Romans by the Alamanni in 282. In the middle ages it was ruled by counts or dukes. About the

12th century a count Hermann called himself margrave of Baden, and as his successors added to their lands they divided them among their families, so causing the little margraviates such as Baden-Durlach to grow up and contribute to the patchwork quilt, as the map of medieval Germany has often been called. Baden was generally regarded as more progressive and democratic than other German states. Charles Frederick, who ruled from 1738 to 1811, both consolidated territory and received large awards between 1803 and 1806 for aiding Napoleon. He became a grand duke, joined the confederation of the Rhine, and left his successor a dominion quadrupled in size. This duke, Charles, opportunely deserted Napoleon in 1813 and in 1815 joined the Germanic confederation. Strife over the granting and revoking of constitutions occupied the early 19th century; but Baden joined the Zollverein, or German customs union, in 1832 and took a big part in the 1848 revolutions.

Forsaking Austria for Prussia after the war of 1866, and allying with Bismarck against France in 1870, Baden gained admittance to the new German empire as a state. Apart from conflicts with the church, it developed prosperity along liberal lines until the First Great War; and afterwards was one of the last states in which the Nazis made headway. The industrial towns were heavily damaged in the Second Great War, after which Baden came into the French zone of occupation.

Baden. Town and watering-place and district of Austria. On the Schwechat, 17 m. by rly. S.S.W. of Vienna, its sulphur springs and baths attract many visitors. The spa rooms were modelled after those at Harrogate. Meierling, about 4 m. away, is the country house wherein the crown prince Rudolf committed suicide in 1889. The most picturesque spot is perhaps the Helenenthal valley. Baden was captured by Russian troops under Marshal Tolbukhin, April 4, 1945. Pop. est. 22,208.

Baden. Town and spa of Switzerland, in canton Aargau. It stands on the river Limmat, at an alt. of 1,260 ft., 14 m. by rly. N.W. of Zürich. Its sulphur baths, known to the Romans as *Thermae Helveticae*, are visited by sufferers from rheumatism, gout, and lung complaints. From 1426 to 1712 Baden was the seat of the Swiss diet. Pop. 10,258

Baden, TREATY OF. One of the treaties which ended the War of the Spanish Succession. The various treaties arranged at the congress of Utrecht and signed in 1713 and 1714 brought about peace between all the belligerents except France and the Holy Roman Empire. Soon afterwards the representatives of certain princes of the Empire met those of France at Baden in Switzerland, where a treaty was signed, Sept. 7, 1714. By it the frontier between France and Germany was restored to its position on the outbreak of war in 1702, France retaining Alsace, but giving up certain fortresses. See Utrecht, Treaty of.

Baden-Baden. Town and pleasure resort of Germany, in Baden. On the little river Oos, 23 m. by rly. S.S.W. of Karlsruhe, it owed its popularity to its climate, its situation near the Black Forest, and to its saline waters. There are a pump room (Trinkhalle), assembly rooms (Konversationshaus), and baths for both sexes, all fine modern buildings; also gardens and promenades. The chief of the older buildings are the parish church, with monuments to the rulers of Baden, and the 15th century castle, with subterranean vaults. There are also ruins of an older castle. The town has an English and a Greek church. Baden was a Roman town, and remains show that the Romans used its waters. In the Middle Ages it was a stronghold and gave its name to the margraviate of Baden.

The town's modern popularity dates from the beginning of the 19th century, and until 1872, when gaming was suppressed, its tables were a great attraction. Lichtenthal, in the neighbourhood, has a nunnery dating from the 13th century, a church, and a chapel wherein are the tombs of some of the margraves. Towards the end of fighting in Europe in the Second Great War, Baden fell to the French 1st army, April 12, 1945. Pop. 25,692.

Badeni, CASIMIR FELIX (1846-1909). Austrian statesman. Born at Surochov in Galicia, Oct. 10, 1846, he was educated at Cracow. Having held several minor official positions, he was made governor of Galicia in 1888. In 1895, when anti-Semitic feeling was very strong, he was chosen prime minister of Austria-Hungary, but only held the post for two years. His name is chiefly associated with an abortive attempt to give the Czech language a position equal to that of the German in Bohemia and Moravia. Badeni died July 9, 1909.

Badenoch. A district of S.E. Inverness-shire, Scotland. Roughly

40 m. by 16 m. in extent and wildly mountainous, it is traversed by the Spey, contains Loch Erich, and has fine deer forests. It was owned by Robert II's son, the Wolf of Badenoch, and the marquess of Huntly, to whose ancestor it was given in 1452, retains the title of Lord of Badenoch.

Baden-Powell OF GILWELL, ROBERT STEPHENSON SMYTH BADEN-POWELL, 1ST BARON (1857-1941). British soldier. Born Feb.



Lord Baden-Powell, soldier, author, and founder of the Boy Scouts

22, 1857, and educated at Charterhouse, he entered the army in 1876, and as a cavalry officer distinguished himself during the Matabele war, 1896-97. When the South African war broke out in 1899 he was besieged in Mafeking, which he held for seven months until relieved. In 1900 he raised and organized the S. African constabulary of 11,000 men, and in 1903 became inspector-general of cavalry in the U.K. Baden-Powell's military genius lay in the direction of observation and scouting.

In 1908 he founded the boy scouts, following an experimental camp in 1907 on Brownsea Island off the coast of Dorset. The publication in 1908 of *Scouting for Boys* brought the scout movement into being. The first rally, held at the Crystal Palace, London, was attended by 11,000 boys. Some girl scouts wearing appropriate shirts and hats appeared at this rally, and to satisfy girls attracted by

scouting "B.-P." with the help of his sister, Agnes Baden-Powell, started the girl guides (*q.v.*). Agnes became the first president, devoted many years to the movement, and maintained interest in it until her death in 1945. The scout movement grew rapidly, and "B.-P." became chief scout. Other countries organized boy scouts and in a few years an international organization had arisen. "B.-P." was knighted in 1909.

In 1912 he married Olave St. Clair Soames, and in 1921, a year after the first international scout jamboree in London, a baronetcy was conferred upon him. At this jamboree "B.-P." became chief scout of the world. He visited almost every country to attend rallies and meetings of scouts, and Lady Baden-Powell, as chief guide, often accompanied him. In 1929 the coming of age of the scout movement was celebrated by an international jamboree at Arrowe Park, Birkenhead, and the King conferred a barony on "B.-P." He chose Gilwell for his title, because Gilwell Park training centre in Epping Forest was known by all scouts. "B.-P.'s" last public appearance was at the fifth world jamboree in Holland in 1937. Afterwards he retired to his home at Nyeri, Kenya, where he wrote a little but devoted most of his time to water-colour painting. He died there Jan. 8, 1941, and was buried there. Memorial services were held throughout the British Empire and in many countries. Scouts in countries then occupied by the Germans produced memorial cards, although scouting was banned.

"B.-P." wrote and illustrated many books, including *Cavalry Instruction*, 1895; *The Downfall of Prempeh*, 1896; *The Matabele Campaign*, 1896; *Aids to Scouting*, 1899; *Scouting for Boys*, 1908; *Scouting Games*, 1909; *Yarns for Boy Scouts*, 1910; *Indian Memories*, 1915; *My Adventures as a Spy*, 1915; *Wolf Cubs' Handbook*, 1916; *Aids to Scoutmastership*, 1919; *Girl Guiding*, 1917; *Rovering to Success*, 1922; *Life's Snags*, 1927; *Lessons from the Varsity of Life*, 1933. See *Boy Scouts*; *Scouting*. Consult also the official life by E. E. Reynolds, 1942; Piper of Pax, E. K. Wade, 1944.

F. HAYDN DIMMOCK

Bader, DOUGLAS (b. 1910). British airman. Although he had lost both legs in a crash in 1933, Bader persuaded the authorities to allow him to rejoin the R.A.F.

BADGES OF REGIMENTS AND CORPS OF THE BRITISH ARMY

- 1—Royal Horse Guards
- 2—Life Guards
- 3—Royal Armoured Corps
- 4—Queen's Bays (2nd Dragoon Guards)
- 5—4/7th Royal Dragoon Guards
- 6—5th Dragoon Guards Motto—*Vestigia nulla retrorsum*
(There is no going back)
- 7—1st Royal Dragoons
- 8—Royal Scots Greys (2nd Dragoons)
- 9—3rd King's Own Hussars
- 10—4th Queen's Own Hussars Motto—*Mente et manu*
(With mind and hand)
- 11—7th Queen's Own Hussars
- 12—8th King's Royal Irish Hussars
- 13—9th Queen's Royal Lancers
- 14—10th Royal Hussars
- 15—11th Hussars Motto—*Treu und fest* (True and steady)
- 16—12th Royal Lancers
- 17—14/18th Hussars
- 18—13/18th Royal Hussars
- 19—15/19th King's Royal Hussars Mottoes—*Honi soit qui mal y pense* (Evil to him who evil thinks); *Merebimur* (We will deserve)
- 20—16/5th Lancers
- 21—17/21st Lancers
- 22—Royal Tank Regiment
- 23—Royal Regiment of Artillery Mottoes—*Ubique* (Everywhere); *Quo fas et gloria ducunt* (Whither duty and glory lead)
- 24—Royal Engineers Motto—*Honi soit qui mal y pense* (Evil to him who evil thinks)
- 25—Royal Corps of Signals
- 26—Grenadier Guards
- 27—Coldstream Guards Mottoes—*Honi soit qui mal y pense* (Evil to him who evil thinks); *Nulli secundus* (Second to none)
- 28—Scots Guards Motto—*Nemo me impune lacessit* (No one provokes me with impunity)
- 29—Irish Guards Motto—*Quis separabit?* (Who shall separate us?)
- 30—Welsh Guards
- 31—Royal Scots
- 32—Queen's (Royal West Surrey Regiment)
- 33—Buifs (Royal East Kent Regiment)
- 34—King's Own (Lancaster Regiment)
- 35—Royal Northumberland Fusiliers
- 36—Royal Warwickshire Regiment
- 37—Royal Fusiliers Motto—*Honi soit qui mal y pense* (Evil to him who evil thinks)
- 38—King's (Liverpool Regiment)
- 39—Royal Norfolk Regiment (now used without wreath)
- 40—Royal Lincolnshire Regiment
- 41—Devonshire Regiment
- 42—Suffolk Regiment
- 43—Somerset Light Infantry
- 44—West Yorkshire Regiment (Prince of Wales's Own)
- 45—East Yorkshire Regiment (Duke of York's Own)
- 46—Bedford and Hertfordshire Regiment Motto—*Honi soit qui mal y pense* (Evil to him who evil thinks)
- 47—Royal Leicestershire Regiment
- 48—Green Howards (Alexandra, Princess of Wales's Own Yorkshire Regiment)
- 49—Lancashire Fusiliers
- 50—Royal Scots Fusiliers
- 51—Royal Welsh Fusiliers
- 52—Cheshire Regiment
- 53—South Wales Borderers
- 54—King's Own Scottish Borderers Mottoes—*In veritate religionis confido* (Our trust is in the truth of religion); *Nisi dominus frustra* (In vain without the Lord)
- 55—Cameronians (Scottish Rifles)
- 56—Royal Inniskilling Fusiliers
- 57—Gloucestershire Regiment
- 58—Worcestershire Regiment Motto—*Honi soit qui mal y pense* (Evil to him who evil thinks)
- 59—East Lancashire Regiment
- 60—East Surrey Regiment
- 61—Duke of Wellington's Regiment (West Riding) Motto—*Virtutis fortuna comes* (Fortune the companion of valour)
- 62—Border Regiment
- 63—Duke of Cornwall's Light Infantry
- 64—South Staffordshire Regiment
- 65—King's Own Yorkshire Light Infantry
- 66—Black Watch (Royal Highlanders) Motto—*Nemo me impune lacessit* (No one provokes me with impunity)
- 67—Sherwood Foresters (Nottinghamshire & Derbyshire Regiment)
- 68—Loyal Regiment (North Lancashire Regiment)
- 69—Northamptonshire Regiment
- 70—Royal Berkshire Regiment
- 71—Queen's Own Royal West Kent Regiment
- 72—Oxford and Buckinghamshire Light Infantry
- 73—Essex Regiment
- 74—King's Shropshire Light Infantry
- 75—Durham Light Infantry
- 76—Middlesex Regiment
- 77—King's Royal Rifle Corps Motto—*Celer et audax* (Swift and bold)
- 78—Wiltshire Regiment
- 79—Royal Hampshire Regiment
- 80—Welsh (Welch) Regiment
- 81—Queen's Own Cameron Highlanders
- 82—Prince of Wales's Volunteers (South Lancashire Regiment)
- 83—Dorsetshire Regiment
- 84—North Staffordshire Regiment
- 85—Royal Sussex Regiment Motto—*Honi soit qui mal y pense* (Evil to him who evil thinks)
- 86—Manchester Regiment Motto—*Concilio et labore* (With deliberation and work) (officers' dress badge)
- 87—Parachute Regiment
- 88—Royal Ulster Rifles Motto—*Quis separabit?* (Who shall separate us?)
- 89—Intelligence Corps
- 90—Seaforth Highlanders Motto—*Cuidich'n Rìgh* (Assist the King)
- 91—Highland Light Infantry
- 92—Gordon Highlanders Motto—*Bydand* (Stand fast)
- 93—Royal Army Veterinary Corps
- 94—York and Lancaster Regiment
- 95—Royal Army Dental Corps
- 96—Corps of Royal Military Police
- 97—Royal Army Medical Corps
- 98—Royal Electrical and Mechanical Engineers
- 99—Royal Army Pay Corps Motto—*Fide et fiducia* (By faith and trust)
- 100—Royal Pioneer Corps Motto—*Labor omnia vincit* (Work conquers all)
- 101—Royal Army Service Corps Motto—*Honi soit qui mal y pense* (Evil to him who evil thinks)
- 102—Royal Irish Fusiliers
- 103—Argyll and Sutherland Highlanders
- 104—Rifle Brigade
- 105—Reconnaissance Corps
- 106—Army Air Corps
- 107—Royal Army Ordnance Corps Motto—*Honi soit qui mal y pense* (Evil to him who evil thinks)
- 108—Auxiliary Territorial Service



Douglas Bader,
British airman

in 1939. Having been fitted with specially made metal legs, he convinced senior officers of his ability to pilot fighter aircraft. Bader, as a squadron leader, led a Canadian squadron of Fighter Command in the battle of Britain, 1940, and shot down at least 15 machines. He fell into enemy hands on Aug. 9, 1941, by colliding with a Messerschmitt after he had shot down another. One of his legs was damaged when Bader baled out; a spare one was dropped at his prisoner-of-war camp by the R.A.F. He was liberated by the U.S. 1st army near Leipzig, April 18, 1945. Returning to England, he led, as wing commander, the squadrons that flew over London, Sept. 15, 1945, to commemorate the battle of Britain. He was awarded the D.S.O. and bar and the D.F.C. and bar.

Badge. Originally the distinctive mark worn by a knight in battle, *e.g.* the ostrich feathers of the Black Prince. Many badges are hereditary, and are as old as, if not older than, the armorial bearings. Though often placed above the arms on the side of the crest, a badge could not be placed on a wreath or helmet, but could be displayed on livery buttons. Most English sovereigns and princes down to William III had their personal badges.

The word is now used for a distinctive mark of any kind, especially one denoting rank or proficiency in the forces or other uniformed bodies, *e.g.* the boy scouts; also membership of particular schools, colleges, regiments, clubs, and other institutions. It is usually worn in the form of a small device of metal or worsted, attached to or sewn into the clothing. A freemason refers to his apron as a badge.

In the British army every regiment has its badge (*see* colour plate), worn as a collar ornament by officers and on the cap by all ranks. These are of metal or worsted. The navy and air force have each one comprehensive badge. For badges of rank in the services *see* Rank. Badges granted for proficiency in the services include the coveted "wings" of an R.A.F. qualified pilot. *See* Brevet.

During the two Great Wars official badges came to be increas-

ingly used with civilian dress, usually on the coat lapel. A conspicuous early example was the silver badge, introduced Sept., 1916, for officers and men and women of the forces who had been discharged through physical infirmity attributable to their service. Badges were also issued to civilians, male and female, employed on munition work or other essential national service, these usually taking the form of a small metal button, engraved with appropriate lettering. Badges of this kind specifically belonging to the Second Great War included those for A.R.P. workers (later Civil Defence workers), members of the merchant navy and the Home Guard, and various types of special workers, *e.g.* employees of the railways and the B.B.C.

The wearing of certain badges by unauthorised persons is illegal,



Badge issued during
Second Great War
to those invalided
from the services

e.g. any army or air force badge other than regimental badges worn as brooches or similar ornaments; those of the boy scouts, girl guides, British Legion, Royal Life Saving Society, Society or Order of S. John of Jerusalem; and the badges of registered nurses, certified midwives, licensed shoeblack, commissionaire, or messenger in London. While the wearing of uniform in public or at a public meeting by members of a political organization is an offence against the Public Order Act, 1936, a mere badge is not usually regarded as a uniform. *See* Chevron; Medal; Orders; Rank; Ribbon; Stripe.

Badger (*Meles meles*). Mammal of the order Carnivora, but a general feeder. The common badger is nearly 3 ft. in length, grey, with a white head striped with black. It burrows in the ground and is harmless and inoffensive unless molested. It lives



Badger. One of the largest of the
wild carnivora extant in Britain

in woods and among the hills, and spends the winter in a state of partial hibernation. When attacked, the badger is a fierce and courageous fighter; it was much used for baiting, a sport prohibited in Great Britain since 1850.

The animal is found in most parts of the Continent and in the wilder parts of Great Britain, its nocturnal habits causing it to be thought much scarcer than it really is. In China it is a valued article of food, and the hind-quarters were formerly cured as small hams in Great Britain. Its hair is used to make the finer sorts of brushes.

Badghiz. Region in the N.W. of Afghanistan, on the frontiers with Persia and Turkmen S.S.R., between the Hari-Rud and Kushk rivers. The Merv-Kushk railway traverses it on the E.

Bad Lands. Extensive areas of land useless for agriculture in the arid areas on the E. side of the Rocky Mts. in Nebraska, Montana, N. and S. Dakota, and Wyoming, U.S.A. The surface consists of easily eroded rock, which is compact in the dry weather, but is quickly carved away by the heavy rain squalls which are characteristic of arid areas. Because of the rapid run-off of the water, there is no vegetation, and the whole area is made up of deep steep-sloped gullies and narrow ridges, which readily change their shape; such districts are useless for settlement and are shunned by travellers.

Badminton. Popular game in India, introduced into the United Kingdom in 1873. It somewhat resembles lawn tennis, being played over a net, with a shuttlecock and long-handled racquet strung with catgut. The game derives its name from the Gloucestershire seat of the duke of Beaufort.

Badminton is played on a space 44 ft. by 20 ft., divided by a net about 5 ft. in height. Two service lines are drawn, one on each side of the net and parallel to it at a distance of 6½ ft.; a central line, connecting the service and base lines, divides those areas into four courts. The shuttlecock is 5 ins. long and weighs ½ oz.; the racquet should not weigh more than 5 oz. The shuttlecock is sent backwards and forwards across the net with great rapidity; hence the preference, especially in Great Britain, for a court in a covered building, as a strong current of air interferes with the play.

The game is played by one or two each side. It differs from lawn tennis in allowing no service faults.

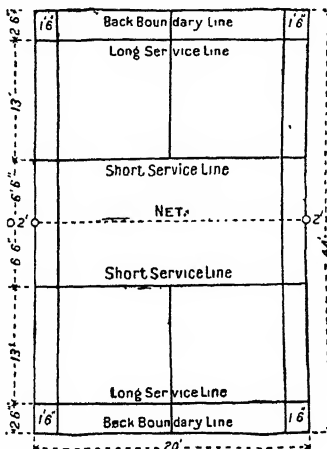
The server stands behind the service line and must hit the shuttle over the net clear of the service line in the opposite diagonal court, and only the player in that court may return the service. Afterwards, any player may return the stroke at any distance from the net. The serve must always be made underhand, i.e. the shuttle must not be higher than the waist line at the moment when struck. When once in play, a fault may result from the shuttle falling outside the court; from touching the dress of a player, or the roof or side walls of the building; or from a player touching the net with clothes or racquet. The score is counted by aces, 15 aces making a game. At 13 all, the side first reaching that number has the option of setting 5; at 14 all, of setting 3 (the side first obtaining the 3 to 5 aces set winning the game).

Badminton. Residence of the duke of Beaufort in Gloucestershire, England. It is on the border of Wiltshire, in the parish of Great Badminton, which has a railway station. The house, built on three sides of a square, stands in a park 9 m. in circumference. In medieval times the estate belonged to the Botelers, from whom it was purchased about 1600 by Sir Thomas Somerset. From him it passed to the duke of Beaufort. Queen Mary stayed here during most of the Second Great War, returning to London in 1945. The church of S. Michael in the park contains the tomb of Field-Marshal Lord Raglan and others of the Somerset family.

Badoglio, PIETRO (b. 1871). Italian soldier and politician. Governor of Libya from 1928 to 1933, he was appointed C.-in-C. in E. Africa, Nov., 1935. For his services in the conquest of Abyssinia he was made viceroy in 1936; but later resigned and was created duke of Addis Ababa. Badoglio signed the armistice of 1940 with France as Italy's representative. On Dec. 6, 1940, during the Italo-Greek war, he was dismissed from his post as chief of the general staff. When Mussolini (*q.v.*) resigned on July 25, 1943, Badoglio formed a non-fascist government. On the surrender of Italy, Sept. 3, 1943, he signed the armistice terms, and had a conference with Gen. Eisenhower (*q.v.*) on Sept. 29 to discuss the best means of employing Italian armed forces against the Germans. He took over the foreign ministry with the premiership, but resigned June 6, 1944. The high court in Rome having reviewed his record,

Badoglio was expelled from the senate, March 29, 1946, for having helped the fascist regime. He wrote Italy in the Second Great War (Eng. trans., 1948). *Pron.* bad-ole-yo.

Badrinath. Peak of the Himalayas, in the Garhwal district of the United Provinces, India. It is 23,210 ft. high. On its slopes, at an alt. of 10,294 ft., stands the



Badminton. Diagram of a court

celebrated temple of Vishnu, which is visited every twelfth year by some 50,000 pilgrims.

Baedeker, KARL (1801-59). German publisher. The son of Gottschalk Baedeker (1778-1841), a bookseller in Essen, where he was born Nov. 3, 1801, he first started in business in Coblenz in 1827. In 1839, by an arrangement with the London publishing house of John Murray, he brought out a small guide-book on Holland, Belgium, and the Rhine. This was the precursor of the long list of similar works bearing his name and carried on by his successors in the business, which was removed to Leipzig in 1872. Most of the guides are published in English and French as well as German, the first volume in English appearing in 1861. Karl Baedeker died Oct. 4, 1859.

Baedeker Raids. Series of air raids carried out by the German Luftwaffe in April-May, 1942, against historic and cultural centres in England. During the R.A.F. bombing offensive against Germany it was inevitable that damage was done to historic buildings, *e.g.*, at Rostock, Cologne, Lübeck. The Germans thereupon stated that the Luftwaffe would destroy every building in Great Britain marked with two stars in Baedeker's guide-books. The cities chosen for

reprisals were all devoid of war industries but full of precious monuments: a fact admitted by the German press when gloating over the damage done.

Exeter was the first target, on the night of April 24; Bath was attacked the next two nights; Norwich on April 27; York on April 28. In all cities damage was done to churches and old buildings. Canterbury, which had suffered in the battle of Britain, received the last Baedeker raid on the night of May 31; the defences had taken heavy toll of raiders, and the Luftwaffe chiefs evidently decided that they could not spare further aircraft for non-military purposes.

Bael Fruit. Fresh or dried half-ripe fruit of *Aegle Marmelos*, a tree growing both wild and cultivated throughout India. Bael is a sacred tree and is often planted near Hindu temples. The fruit was introduced into European medicine about the middle of the 19th century as a remedy for diarrhoea and dysentery.

Baena. A town of Spain, in the prov. of Cordova. The Roman Baniana, it is situated 32 m. S.E. of Cordova, has farming and horse-breeding industries, manufactures linen, produces olive oil, and trades in grain and wine. The town, which has a castle formerly belonging to Gonzalvo de Cordova, sustained a siege by the Moors in 1292, and was the scene in 1361 of the murder of the Moorish king of Granada, Abu Said, and his courtiers by Pedro the Cruel. Pop. 18,000.

Baetica. Ancient division of Spain. It corresponds to Andalusia and parts of Extremadura and New Castile. A province under the Roman empire, it took its name from the river Baetis (Guadalquivir).

Baetylus (Gr. *baitylos*). In ancient times, a kind of fetish. These baetyli were conical or wedge-shaped stones, said to have fallen from heaven. They were regarded with awe and anointed with wine, blood, and oil.

Baeyer, JOHANN FRIEDRICH WILHELM ADOLF VON (1835-1917). German chemist. Born in Berlin and educated at Berlin and Heidelberg universities, he became professor of chemistry at Strasbourg in 1872 and at Munich in 1875. In 1881 he was awarded the Davy medal by the Royal Society of London for researches in the chemistry of indigo, and in 1905 the Nobel prize for chemistry. He wrote much on organic chemistry, and his collected works were published at Brunswick in 1905. Died Sept. 5, 1917.

Baeza. City of Spain, in the prov. of Jaén. It is 20 m. N.E. of Jaén, in the valley of the Guadalquivir, and is the terminus of a branch rly. It has a cathedral, a once famous university (1533), now a seminary, and the monastery of S. Philip Neri. An annual horse fair is held in the city, and soap, alcohol, and leather are manufactured. The ancient Beatia, it was sacked by the Castilians under Ferdinand III in 1228.

Baffin, WILLIAM (d. 1622). An English navigator and explorer. Born in London about 1584, he took part as pilot, under James Hall, in an expedition in 1612 to Greenland for the discovery of the north-west passage, and in 1613-14 was in command of the English whaling fleet off Spitsbergen. In 1615, under Bylot, he acted as pilot of the Discovery in another search for the north-west passage, during which voyage he explored the bay that bears his name. In 1620 he sailed as master to the E. Indies, and on Jan. 23, 1622, was killed while fighting at Ormuz. Consult *Voyages of William Baffin*, ed. C. R. Markham, 1881.

Baffin Bay. Inland sea of N. America. Within the Arctic Circle, between Greenland and Canada, it opens S. through Davis Strait, N. through Smith Sound and Kennedy and Robeson Channels, and N.W. through Lancaster and Jones Sounds. Its shores are rocky and precipitous, and it is generally ice-covered, being navigable only for about four months in the year. Whales, seals, and bears abound. It was named after William Baffin, who first explored it in 1616. About 825 m. long, it has an average breadth of 280 m. and a maximum depth of 6,890 ft.

Baffin Island. An island of British N. America. Lying W. of Baffin Bay and Davis Strait, E. of Fox Channel and the Gulf of Boothia, and N. of Hudson Strait, and largely within the Arctic Circle, it is mountainous, extremely indented, and barren. It is probably the sixth largest island in the world, its area being about 237,000 sq. m. It is uninhabited except for a few Eskimos along the E. coast.

Bafulabé. A town of French W. Africa, in the colony of French Sudan. It stands on a peninsula between two of the Senegal's head-streams, 95 m. S.E. of Kayes, on the rly. to Bamako. It trades in kola-nuts and millet. Pop. 2,000.

Bagamoyo. Town and harbour of Tanganyika, formerly German E. Africa. It is opposite

the island of Zanzibar, between Dar-es-Salaam and Tanga. Before the construction of railways it was the principal starting-point for caravans to the interior and the great lakes. It is now the capital of a district of the same name, which produces oranges, lemons, citrons, and other fruits. On Aug. 15, 1916, the military coastal station was occupied by British naval forces who remained in possession. Pop. 5,000.

Baganda OR **WAGANDA.** Negroid tribe of Bantu speech and culture, mostly in the Buganda prov. of the Uganda protectorate. Tall, chocolate-hued, brown-eyed, they occupy beehive huts and practise agriculture. Their pottery and basketry are excellent; their barkcloth dress has been ousted by imported calicoes. Through early contact with pastoral Hamites of Galla relationship, they reached the acme of negro civilization, with political institutions and a reigning dynasty traceable for five centuries. Bodily mutilations were prohibited; human sacrifice, formerly rife, has ceased since their conversion to Christianity. See Bantu.

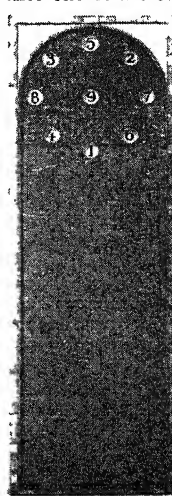
Bagasse. Woody matter left after the juice has been extracted from sugar-cane, sugar-beet, or sorghum. Formerly used as fuel in the sugar factory, it is now utilised as food for livestock, as manure, and in paper-making, etc. Other forms are begass, begasse, megass, and megasse, and other names cane-trash and cane-straw. The word is French, adapted from Spanish *bagazo* (the refuse of sugar-cane, olives, grapes, palms, etc., after pressing), which may be a variant of *bagaje* in the sense of "dregs," "rubbish." See Sugar.

Bagatelle. Indoor game. Notwithstanding the spelling, it is probably not of French origin, but more likely an improvement upon, and development of, an old English game known as shovel board, popular as far back as 1600.

The oldest and most popular form of bagatelle is played upon a table 10 ft. in length and 3 ft. in width. The bed of the table is of slate, covered with green cloth like a billiard table. The top of the table forms a semicircle, and that and the sides are fitted with rubber cushions. At the top of the table, let into the slate bed, are nine holes or cups, numbered 1 to 9. Some tables are fitted with pockets also, while others have neither cups nor pockets. On boards without cups and pockets the game consists entirely

of cannons, and is regarded as the highest form of bagatelle.

In the cannon game three balls are used as they are at billiards, and the method of scoring is the same, a cannon counting two points, while the game is usually from 21 to 50 points up. The cannon game is sometimes played on a table with cups, in which case it is usual for cannons only to count to the striker. Balls that are sent into the cups count to his opponent, but are replaced, the red on a spot 12 ins. below cup 1, its original place, and the opponent's ball midway between cups 1 and 9. A player cannot score any points through driving a ball into one of the cups, unless he has



Bagatelle board

first effected a cannon with the same stroke. If the striker plays at his opponent's ball and misses, he is penalised one point; if he plays at the coloured ball and misses, the penalty is five points.

"Corinthian" bagatelle, much played in the 1930s, was really a different game and far more one of chance. The balls were not struck with a billiard cue, but either pushed from above by a stick or discharged by a spring; they entered numbered cups after negotiating forests of pins on the board. The scores available were multiplied by tens and hundreds, and finally by thousands on the trays with glass covers and electric scorers in pin-table saloons.

Bagdad. Liwa or province of Iraq. Traversed by the Euphrates and bordered in the extreme S.W. by the Tigris, it includes most of ancient Babylonia. Its fertile soil received little attention under Turkish rule, but during its occupation by the British, 1917-30, considerable development took place. Pop. 805,293.

Bagdad OR **BAGHDAD.** City of Iraq. Formerly one of the most populous and important cities of the world, it stands on the Tigris, about 300 m. above the Shatt-el-Arab, or about 330 m. from the Persian Gulf. Before the First Great War it was the capital of a Turkish vilayet of the same name.

Parts of the walls, which once completely surrounded it on both banks of the Tigris, remain. After occupying the city in 1917, the British constructed a boat bridge on the river called after General Maude at a cost of £56,133.

Girt with date-palms, the city, from which rise many minarets and towers, is imposing from the outside, but its streets are mostly narrow, its bazaars far from spacious, and its houses rather mean, the better part being on the E. side of the river. Under the Turks it was dirty and even squalid, with the finest of its old buildings falling into decay. Among these are the Gate of the Talisman and the tomb of Zobeida, the wife of Haroun-al-Raschid; its colleges, once renowned, are crumbling into ruins. The famous Oriental library of over 20,000 volumes, including unique Arabic MSS., was burned by the Turks in March, 1917.

Situated on an extensive plain, and easy of access from E., S., and N., it was long a great centre of trade, but under Turkish rule its commerce suffered a material decline, to which the opening of the Suez Canal, with new routes E. and W., largely contributed. Irrigation is indispensable for assuring adequate crop yields. Bagdad exports wool, gums, galls, opium, dates, skins, hides, and carpets. Its imports include Manchester and Indian cotton goods, coffee, sugar, indigo, pepper, and tobacco. Before the First Great War it had manufactures of red and yellow leather, as well as plush. The climate, though hot in summer, is fairly good. The pop. of perhaps 270,000 is mixed, with the Arab strain predominating.

Bagdad was built in 763 on the ruins of the ancient Ctesiphon and Seleucia by the Abbaside caliph Al Mansur, and within a few years it reached a height of splendour under Haroun-al-Raschid. For a long period it was the capital of the Saracenic empire, a vast emporium, and a home of learning. But in 1258 it was sacked by the Mongols and the Abbaside caliphate perished. Tamerlane in 1400 swept through it, and later both Turks and Persians contended for its possession, the former finally occupying it in 1638. It suffered severely from plague, notably in 1831, when two-thirds of the inhabitants perished. Towards the end of the 19th century the city came into prominence in connexion with the German dream of a rly. from Hamburg and Berlin, which was broken by the First Great War. Bagdad was

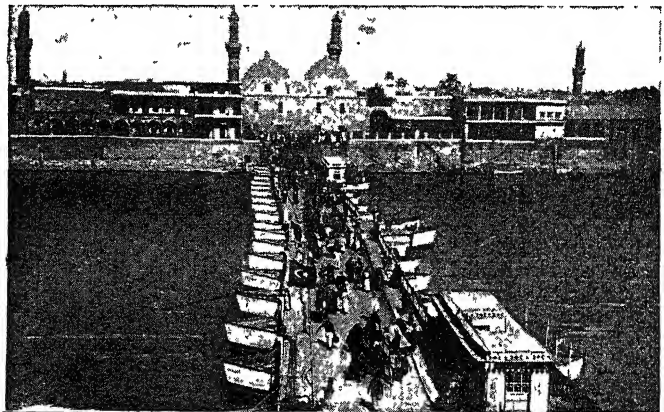
captured by the British, March 11, 1917 (*see below*), but its government was respected.

In 1940 the Berlin-Bagdad rly. (*q.v.*) was completed. During the German-inspired revolt of April, 1941, in Iraq, 500 British residents sought refuge in the British embassy and U.S. legation at Bagdad, and were held as hostages until released by the armistice of May 31 between the Iraqi authorities and the occupying British troops. The child-king Feisal II and the regent Emir Abdul Ilah (*q.v.*) returned to Bagdad in state on June 1. *See Iraq.*

Bagdad, CAPTURE OF. British success, March 11, 1917. After the recapture of Kut by General Maude, Feb. 24, 1917, the Turks retreated up the Tigris towards Baghela, and vigorous pursuit soon turned the retreat into a rout. Beyond Baghela Turkish infantry fought a rearguard action, and again at the Nahr Kella Bend, a few miles higher up, where they strongly attacked the naval flotilla harassing them from the river.

The pursuit halted for a while at Aziziyeh, but was renewed on March 5, when the cavalry reached Lajj and fought a Turkish rearguard, which retreated during the night. Next day the cavalry passed Ctesiphon, and on March 7 were at the Diala, which from the N. flows into the Tigris 8 m. below Bagdad. A successful crossing of the Diala was made at several points on the night of March 9-10. East Lancashires and Wiltshires were the first to get across and link up with a small detachment of Loyal North Lancashires which had crossed on the previous night.

On March 10 the Turks evacuated their last position in front of Bagdad on that side of the Tigris, and the British occupied it. In the meantime General Cobbe operated against the Turks on the other side of the river, and met with some opposition. This, however, ceased altogether on March 10. On both banks of the Tigris the British were thus on that day close to Bagdad, and on March 11 it fell into their hands.



Bagdad. General view over the city showing its characteristic flat-roofed houses. Above, boat-bridge across the Tigris, from the east

Bagé. Town of Brazil, in Rio Grande do Sul state. Situated 170 m. by rly. W.N.W. of Rio Grande do Sul, it is the centre of a rich agricultural district, producing fine cattle, horses, wine, wheat, maize, barley, and alfalfa.

Baghot, WALTER (1826-77). British economist and author. Born at Langport, Somersetshire,



Walter Baghot,
British economist
and author

Feb. 3, 1826, son of a banker and shipowner and of French descent, he was educated at Bristol and University College, London, where he won distinction in mathematics, mental and moral philosophy, and also in political economy. After a visit to Paris, where he witnessed and approved the *coup d'état* of Dec., 1851, he was called to the bar, and then became a partner in his father's business. He wrote for *The Prospective Review*, and to *The National Review*, of which he was co-editor with R. H. Hutton, 1855-64, contributed the *Estimates of Some Englishmen and Scotchmen*, later included in his *Literary and Biographical Studies*.

In 1858 Baghot married the eldest daughter of James Wilson, founder of *The Economist*, which he edited from 1860 until his death. His *English Constitution* appeared serially in *The Fortnightly Review* before its issue in book form in 1867. *Physics and Politics*, an attempt to apply the principles of natural selection and inheritance to political society, appeared in 1872, and *Lombard Street: A Description of the Money-Market*, another influential work, in 1873. His *Depreciation of Silver*, *Essays on Parliamentary Reform*, and *Economic Studies* were published posthumously. He died at Langport, March 24, 1877. His house afterwards became the office of the local council.

A man of wide sympathies, culture, humour, wit, and imagination, a scientific thinker, with a clear forthright style and gift of epigrammatic illustration, he sought always for fundamental facts. Sincere as was his regard for learning, he had a greater regard for its application to the practical needs of life. While others saw facts, he saw their relativity. This gift, applied to such subjects as the money markets and politics, made his book *Lombard Street* a factor

in English commercial life, and makes his *English Constitution* a work that may still be consulted by students with profit.

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Baggara (cowherds). African "Arabs," mainly in S. Kordofan. Claiming unmixed descent from Beduin Moslems, their non-Semitic physique, dark-brown skin, and "fuzzy-wuzzy" mop-like hair betoken Hamite-negro infusion. Having driven the aboriginal Nubas into the mountains, they maintain a nomad existence in the plains, where their courage and fanatical fierceness have brought them notoriety. The Mahdi's successor, the khalifa Abdullah (1846-99), was of this people.



Baggara. A typical
warrior of the Eastern
Sudan

Baggy Beds. Subdivision of the Devonian rocks of N. Devon. They occur between the Pickwell Down Sandstone below and the Pilton and Bramerton Beds above. Containing a lamellibranch fauna similar to that of the Coomhola Grits of the S. of Ireland and the Condrosian Beds of Belgium, for the most part they consist of green slates and brown sandstones. They are well exposed on the coast of N. Devon near Baggy Point.

Baghal. Indian state of the Himachal union. A former Simla hill state, it lies S. of the Sutlej river. Area 120 sq. m. Pop. 27,925, nearly all Hindus.

Baghat. Indian state of the Himachal union. A former Simla hill state, it has an area of 33 sq. m. and a pop. of 11,022, mostly Hindus.

Baghelkhand (Country of the Baghelas). Region of Central India, including the former states of Rewa, Nagod, Maihar, Sohawal, Taraon, and Kothi, now all in the Vindhya union. It has an area of 14,323 sq. m. and is rich in timber and minerals. Rewa, the old capital, has a pop. of 25,206.

Bagheria or **BAGARIA.** Town of Sicily, in the prov. of Palermo, 8 m. by rly. S.E. of Palermo. The Villas Palagonia and Butera contain curious works of art. Pop. 19,500.

Bagimond's Roll. Document giving the value of all church property in Scotland in the 13th century. The word is a corruption of Boiamund, the name of a cleric who drew up the roll at the request of Pope Gregory X, by whom he was sent to Scotland to collect a tenth of all church revenues for the purpose of a crusade. Ecclesiastical taxes were assessed in accordance with it for some centuries.

Bagirmi. Region of Africa. Lying S.E. of Lake Chad, it forms the Bagirmi dept. of Chad Territory, French Equatorial Africa. To the N. is the circumscription of Bas-Shari, to the E. Wadai, and to the W. Cameroons. The Bagirmi country, which does not exactly correspond to the political division, extends some 250 m. N. to S., and about 170 m. W. to E. A southern extension of the Lake Chad depression, its surface is generally flat, the greatest heights being about 3,000 ft. above sea level, and the mean alt. 1,000 ft. Well watered by the Shari and Logone rivers and their tributaries, it contains numerous swamps, but suffers from severe droughts.

The Bagirmi are a mixed negroid people and include numerous Fula and Arabs. The pop. of the dept. is about 75,000 and its area approx. 30,000 sq. m. It has three subdivisions, Massénia, Malfi, and Bousso. Massénia (pop. 10,000) is the seat of the French administrator. Considerable powers remain, however, in the hands of the native rulers.

Bagirmi was visited by Denham in 1823, Heinrich Barth in 1852, and Gustav Nachtigal in 1872. In 1871 it was conquered by the sultan of Wadai, and was later overrun by Rabah, by whom the first French expedition, under Paul Crampel, was imprisoned. French authority was established in 1901.

Bagnacavallo. Town of Italy, in the prov. of Ravenna. The ancient Tiberiacum, it is 14 m. by rly. W. of Ravenna. Its ancient walls, and a church founded 5th cent., are preserved, though the town suffered some damage in the Second Great War. Canadian troops of the 8th army captured it Dec. 21, 1944.

Bagnères-de-Luchon. Town and inland watering-place of France, in the department of Haute-Garonne. In a beautiful valley of the Pyrenees, a few miles from the Spanish frontier, and a tourist centre for the Central Pyrenees, it has hot sulphur springs, known to the Romans, a fine bathing establishment, and a casino.

Bagnes. Name given to certain French prisons abolished in 1852. The word comes from the Italian *bagno*, a bath, probably because in Constantinople the prison stood near the seraglio baths. When the use of galleys was discontinued in the French navy, about 1715, it was necessary to find other employment for long-term criminals, and many were put to labour in the dockyards. They lived on the old galleys, but prisons on shore, the *bagnes*, were opened later for them at Toulon, Brest, and Rochefort.

Bagni di Lucca. Spa of Italy, in the prov. of Lucca. Beautifully situated in the Lima valley, 15 m. by rly. N.N.E. of Lucca, its hot springs, known in the 11th century as the *Bagni* (baths) di Corsena, attract numerous visitors. Ponte a Serraglio, where are the best baths, has a casino; at Villa there is an Anglican church, and *Bagni Caldi* has mud baths and a grotto with a natural vapour bath.

Bagnigge Wells. Former London pleasure garden. It was in King's Cross Road, once Bagnigge Wells Road. Bagnigge House, a central feature, is said to have been a summer residence of Nell Gwynn. The place became fashionable after the discovery here, in 1757, of a ferruginous chalybeate well and a cathartic well. Later the tea gardens, concerts, dancing, etc., became attractions. The last entertainment was given here in 1841, and the site is partly covered by a modern tavern.

Bagnold, ENID. English author. She was educated at Godalming and Paris, and wrote her first book, *A Diary without Dates*, in 1917. With *National Velvet*, 1935, the story of a racehorse and its child owner who win the Grand National, she established her reputation. A film based on this novel was made in 1945. After writing *The Squire*, 1938, Enid Bagnold scored a success with a play, *Lottie Dundass*, a study in abnormal psychology culminating in murder. This was produced at the Vaudeville Theatre, London, in 1943. In 1920 Enid Bagnold married Sir Roderick Jones, former principal proprietor of Reuters.

Bagnold, RALPH ALGER (b. 1896). British scientist and soldier, whose exploits in the Middle East are noticed under Long Range Desert Group.

Bagot, BARON. English title borne since 1780 by the family of Bagot. A Bagot held land in 1086 in Staffordshire, where his descendants lived for hundreds of

years, and Bagot's Bromley perpetuates their name. Sir John Bagot was a man of importance in the time of Henry IV and Henry V. One of his descendants, Sir Hervey Bagot, a staunch Royalist, was made a baronet in 1627. His four successors in the title were all members of parliament for Staffordshire, as was Sir William Bagot (1728-98), who was created a baron in 1780. He had a large family, and



William, 2nd Baron Bagot
After Hoppner

from him several existing branches of the Bagots are descended. In 1946 the title came to Caryl (b. 1877), 6th baron. The family estates are in Staffordshire and Denbighshire.

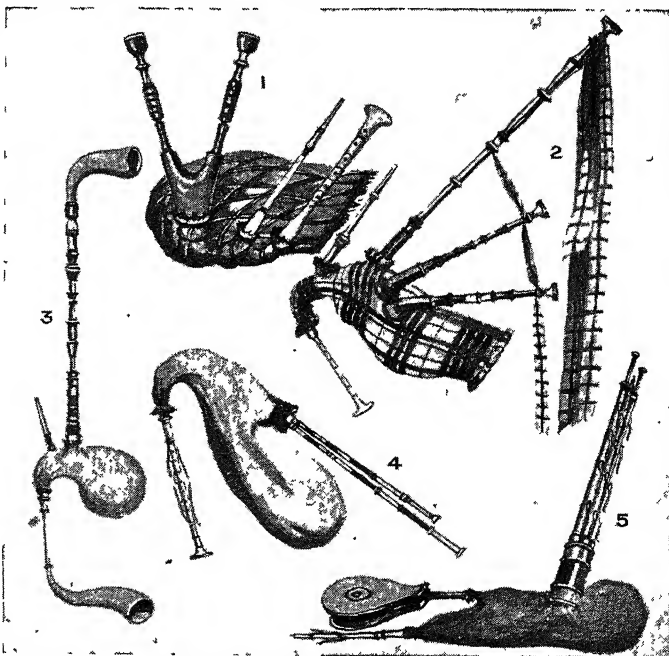
Bagot, RICHARD (1860-1921). British novelist. Born Nov. 8, 1860, he was educated privately. In early life he made his home in Italy, where he became known as a novelist and an authority on Italian literature and public affairs. His novels include: *A Roman Mystery*, 1899; *The Just and the Unjust*, 1902; *Donna Diana*, 1903; *The Passport*, 1905; *The House of Serravalle*, 1910; and *The Gods Decide*, 1918. Among his other

works are *My Italian Year*, 1911; *The Italians of To-day*, 1912. He died Dec. 11, 1921.

Bagpipe. Musical wind instrument. It has a wind reservoir, filled by the breath, and the sound is produced by reed-tongues in pipes, several providing the characteristic drone, while one, called the chanter, which is governed by finger-holes, gives the melody.

A pipe with the bag attached was one of the earliest musical instruments in Europe, and was known in Asia. In Italy it is shown on a famous coin of the days of Nero (A.D. 54-68). The Lincolnshire bagpipe is mentioned by Shakespeare. The Northumbrian pipe was identical with the Lowland Scottish instrument. It was blown by means of bellows, and, like the Highland pipe, had first one and then two drones. The third or great drone and the great size of the whole instrument in its latest stage apparently originated in the Scottish Highlands.

The Irish pipe is scientifically the most complete form of bagpipe. It is blown with a bellows by a performer who is seated, while the Highland piper always stands or walks up and down. It has three drones all fixed in one stock, which are carried horizontally on the arm. The Highland pipe has only nine notes—from A to A with an additional G. A is the



Bagpipes. 1. Specimen dated 1409. 2. Modern Scots bagpipe. 3. Old German, c. 1680. 4. Northumbrian pipe. 5. Irish pipes, with bellows attachment

key-note, and to it the drones are tuned. The scale of the Irish pipe is nearly perfect, and the drones are provided with keys, as is the chanter. The Northumbrian pipe had originally eight notes, and was also sometimes provided with keys.

There is a great wealth of Scottish bagpipe music, much of which is not suitable for the clarsach (small harp), the great indoor instrument of the Gael. Much of the music of the western clans has been written down in *Cannlatair-acha*, its own ancient notation. That of the eastern clans has still to be recorded. The Highland piper was thoroughly taught during a long apprenticeship at the schools for pipers kept by the MacCrimmons of Skye, and others. The last of the MacCrimmons died in 1822.

The pipes were as popular in the Lowlands as in the Highlands and at court, where it is on record (Exchequer Rolls) in 1362 that the king had his pipers. One or more were employed by every burgh. Perth had its town pipe as late as 1837. The office, like that of the clan pipers, was hereditary. One of the finest of Scottish ballads (by Semple of Beltrees) commemorates the death of the burgh piper of Kilbarchan. Not every pipe tune is a pibroch, as is generally assumed. *Piobaireachd* or *Ceol mor* means simply great (classical) music, and this includes only the "gathering," the "salute" or welcome, and the "lament." It proceeds on a regular *urrlar* (ground work) of ten sections, each section trebled before the next starts.

Bagramyan, IVAN. Russian soldier. Born near Kirovabad, Azerbaijan, of Armenian ancestry, he became a cavalry officer in the Red Army. Having been a regimental commander, passed through the Frunze academy at Moscow, and served as a staff instructor for three years, he was in the Ukraine when Germany attacked Russia in 1941. Promoted to general after victories at Kharkov and Vitebsk, he led the 1st Baltic army to the capture of Nevel, Oct. 7, 1943, and in an offensive below Riga in 1944. On Jan. 28, 1945, his troops took Memel and liberated Lithuania S.S.R.

Bagration, PETER IVANOVITCH, PRINCE (1765-1812). Russian soldier. He entered the service in 1783 and fought in Russia's various campaigns. He is famous for his great stand with 6,000 men against 30,000 French under Murat at Hollabrúnn in 1805, by which at cost of losing half his men he



Prince Bagration,
Russian soldier
From an engraving
of 1808

covered the retreat of the main Russian army under Kutusov. Bagration also took part in the battles of Austerlitz, Eylau, and Friedland, and in 1808 he captured the Aaland Islands. He died of wounds received at Borodino, Sept. 7, 1812.

Bagshot Beds. A series of white, grey, yellow, and brown sands, with occasional pebble-beds, overlying the London clay in the London and Hampshire Basins, and forming the middle member of the Eocene System (*q.v.*). They occupy large tracts in Berkshire, Hampshire and the Isle of Wight, Dorset, and Surrey, and smaller areas in Middlesex and Essex. The white sands are largely used in glass making. They are well exposed in Alum Bay in the Isle of Wight, and at Studland in Dorset.

Bagshot Heath. Sandy district of N.W. Surrey, England. Starting 3 m. S. of Ascot, it extends 50 sq. m. It was formerly a royal forest, and in coaching times was frequented by highwaymen. Bagshot Park is crown property. The mansion is in the Tudor style, and was a hunting seat of James I.

Bagster, SAMUEL (1772-1851). English publisher. Born and educated at Northampton, he started business in London in 1794, and was the first to supply cheap and portable polyglot Bibles, with notes, to which the patent of the universities and the king's printer did not apply. The first of his many polyglot editions was The English Version of the Polyglot Bible, 1816, containing more than 60,000 parallel references. He died March 28, 1851.

Baguet (Fr. *baguette*). Architectural term for a small convex moulding or bead of cylindrical or semicircular section. See Moulding.

Baguio. Town in the Philippine Islands, in the mountain prov. of N. Luzon. It is the summer seat of government, and is about 40 m. N.E. of Lingayen. Pop. 27,000.

Another Baguio is a seaside village in Bataan, where an open-air hospital was set up during the U.S. defence against the Japanese.

Bahadur Shah. Title of two Mogul emperors of Hindustan. The first, named Muazim, was the son of Aurungzebe. On his father's death he defeated his brother

Azam, and, adopting the title of Bahadur Shah, was emperor from 1707 to 1712. Bahadur Shah II was nominally emperor of Hindustan at the time of the Mutiny, 1857. Having held the empty title since 1837, he was living in Delhi when the mutineers hailed him as their ruler. He was taken prisoner and tried, his sentence of death being commuted into one of transportation. He died at Rangoon, Nov. 7, 1862. Under the name of Safar, or Victory, he wrote poems.

Bahai, SIR ABDUL BAHÁ ABBA (1844-1921). Indian reformer. Head of the Bahai cult, advocating universal brotherhood and sex equality, he had great influence in the Middle East, and was knighted, 1920, dying Nov. 28, 1921.

Bahama Channel, OLD AND NEW. Two straits communicating between the Gulf of Mexico and the Atlantic. The old channel separates Cuba and the new Florida from the Bahama Islands.

Bahamas OR LUCAYOS (Span. *Los Cayos*). Group of islands and rocky islets in the British West Indies. They include 29 islands, over 650 cays or islets, and nearly 2,400 rocks, extend for some 650 m. between Florida and Haiti, cover an area of 4,404 sq. m. Estimated pop. is 68,846. The chief islands are New Providence, Great Abaco, Grand Bahama, Eleuthera, Andros, San Salvador or Cat, Acklin, Long Island, Great Inagua, Crooked, and Mayaguana. About twenty of the group are inhabited. Geographically the Caicos and Turks Islands belong to the Bahamas, but politically they form a dependency of Jamaica.

Of coral formation, the islands are low lying, generally long and narrow, and, except in Andros, devoid of streams. The highest alt., 410 ft., is reached in Cat Island. The mean temperature in the summer is 88° F. and in the winter 70°. The soil, though poor, produces oranges, lemons, pineapples, tomatoes, maize, cotton, sisal hemp, and vegetables. The waters abound in fish, which are taken in considerable quantities. The cultivation of sisal, formerly a progressive industry, has somewhat diminished; and in recent years the once flourishing sponge fishing industry has been almost wiped out by disease. Straw articles are widely made. Negroes, descendants of former slaves, form about 85 p.c. of the population; the white people are mainly descendants of emigrants from New England. The islands are administered by a governor, with

the assistance of executive and legislative councils and a representative assembly of 29 members. The duke of Windsor (*q.v.*) was governor 1940-45. Nassau, on the island of New Providence, is the seat of government.

The Bahamas were the first land discovered by Columbus in 1492, and one of them he named San Salvador. Settled by the British in 1629, their possession was frequently disputed by the Spanish until their cession to Great Britain in 1783. During the American Civil War they prospered greatly in consequence of the closing of the southern ports of the United States, Nassau then becoming a station for the blockade-runners. In 1866, 1883, and 1945 great damage was caused by cyclones. Prohibition in the U.S. caused a great expansion of trade in Nassau in the 1920s, and the Bahamas subsequently attracted many tourists. In 1940 sites for air and naval bases on the E. side were leased to the U.S.A. under the Anglo-American naval agreement.

Bahawalpur. Punjab state, since 1947 in Pakistan. Bounded N.W. by the Sutlej and Indus rivers and S. by the Rajputana Desert, and with an area of 16,434 sq. m., it is level, arid, and sandy, but fertile where irrigated, and produces cotton, sugar, and indigo. The capital, Bahawalpur, is near the left bank of the Sutlej, 69 m. by rly. S. of Multan. It contains a fine palace and manufactures silk. Pop. of state, 1,341,209, mostly Mahomedans; town, 18,750.

Bahía. Maritime state of central Brazil. Largely mountainous, but fertile, and traversed by the São Francisco, navigable for 600 m., its tributaries, and many other rivers, it has an area of 217,670 sq. m. It produces 96 p.c. of the country's output of cocoa; also coffee, sugar, Brazil-wood and cedar, cotton, tobacco, maize, rice, beans, copal, mangoes and other fruits, and rubber. Some gold, iron, copper, and diamonds are found. It is served by the Bahía-São Francisco rly. and other lines. Pop., including a large number of negroes, 4,292,900.

Bahía or São Salvador. Seaport and city of Brazil, the capital of Bahía state. Built on a cliff and the shore of the Bahía de Todos Santos (All Saints' Bay), it has an excellent harbour and is the centre of rly. and telegraph systems. The seat of an archbishop and formerly the metropolis of the Brazilian Church, it has a handsome marble cathedral, an archiepiscopal palace,



Bahamas. Group of coral islands in the W. Atlantic, the first land sighted by Columbus on his voyage of discovery in 1492

numerous churches, a museum, and a library. A university was inaugurated here in 1946. Coffee, cocoa, sugar, tobacco, cotton, hides, and timber are exported, and textiles, boots, hats, snuff, and beer manufactured. Settled in 1510, Bahía was the capital of Brazil from 1549 to 1763. Pop. 363,726.

Bahía Blanca (Span., white bay). City and seaport of Argentina, in the prov. of Buenos Aires. On the Naposta, 3½ m. from its mouth in the bay, and 398 m. by rly. S.W. of Buenos Aires, it dates from 1828. The port has four divisions: Puerto Belgrano, which has been taken over by the government and has excellent facilities for handling cargo; Puerto Militar, a military and naval station of the republic; Puerto Galvan, where elevators can store 46,000 tons of grain; and Puerto Ingeniero White, with warehouses, elevators, and timber mole. They owe their origins almost entirely to rly. companies. Bahía Blanca serves the rich farming area of the neighbourhood by exporting wheat and wood. It is a modern city with pop. 119,086.

Bahía Honda (Span., deep bay). Harbour on the N.W. coast of Cuba. It is 55 m. W.S.W. of Havana, trades in sugar, and is a coaling station of the U.S.A.

Bahima or WAHUMA. People of Hamitic descent, mostly in the Uganda Protectorate. Tall, fair, often handsome, with one-fourth caucasoid and three-fourths negro blood, they retain their ancestral pastoralism, forming an aristocracy in Unyoro, a ruling caste in Toro, and a dynastic domination in Ankole. In Buganda they have become servile herdsmen. In the region, formerly German, between the Victoria and Tanganyika lakes, they are called Batutsi, and Barunda. The singular of Bahima is Muhima. The women, scrupulously dressed, are the only Central Africans who are veiled. The Bahima were specially studied by the Mackie Ethnological Expedition in 1919.

Bahr. Arabic word for a body of water generally. It frequently occurs in the names of rivers and seas in the Middle East.

Bahraich. Municipality of India, in the United Provinces. The capital of Bahraich district, 70 m. N.E. of Lucknow by a branch rly., it is a popular place of pilgrimage, both for Mahomedans and Hindus, and contains the tomb of Masaud, killed in battle, 1033. It manufactures fireworks and cloth. The inhabitants are almost equally Hindus and Mahomedans. Pop. 27,371. Bahraich district is in the Faizabad division of Oudh,

is 2,645 sq. m. in extent, and has a pop. some four-fifths of which consist of Hindus.

Bahram. English racehorse. A colt by Blandford out of Friar's Daughter, in 1935 he won the Two Thousand Guineas, the Derby, and the St. Leger, thus gaining the triple crown for the Aga Khan. F. Fox was the jockey in the first two races, C. Smirke in the last. Like many of the Aga Khan's horses, Bahram was named after a character in oriental history.

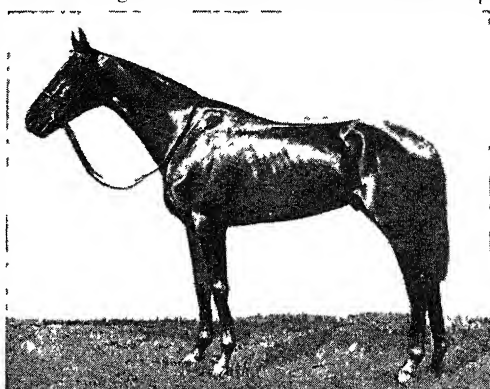
Bahrein Islands. Group of islands in the Persian Gulf, 20 m. off El Hasa, Arabia. Bahrein Island, the largest, is 27 m. long and 10 m. wide, the next being Muharrak, N.E. of Bahrein, 4 m. long and 1 m. wide. Other islands are Sitra, Nabi Saleh, Jidi, Raka, and Um Nahsan, the last three uninhabited. Manama, on Bahrein, the capital and chief port of the group, has a pop. of 28,000, and Muharrak, on the island of the same name, has 18,000. The pop. of the group is about 120,000, chiefly Persians and Arabs. Most are of the Shia sect.

The islands are ruled by a native sheikh under British protection. Pearl-fishing employs about 277 boats for 6 months. The islands produce dates, citrus fruits, lucerne, and a fine breed of white donkeys. Oil was discovered in 1932 and is being worked. Sailcloth and mats are made. The islands contain many thousands of conical tombs, varying in size, some being as much as 300 ft. in diameter and 40 ft. in height. Their origin is unknown, but they are of very ancient date, and, covering many miles of ground, constitute the largest cemetery in the world. Some 200 fresh-water springs serve for purposes of irrigation.

On Sept. 10, 1939, the sheikh of Bahrein tendered to Great Britain the support of himself and the resources of his state in the conflict with Germany. Bahrein was of strategic importance in the defence of India, and her oil wells contributed a valuable quota of petroleum to the Allied armies in the Middle East. Throughout the war, Bahrein provided a stage in the air route to India.

Bahr-el-Abiad. Arabic name for the White Nile, applied to that part of the Nile from the junction of the Bahr-el-Jebel and Bahr-el-Ghazal at Lake No to the confluence with the Bahr-el-Azrek, which flows from the highlands of Abyssinia. It continues N. and is thereafter known as the Nile. It receives the waters of the Sabat

and the Bahr-el-Zeraf. When the Nile flood fills the valley below Khartum the waters of the Bahr-el-Abiad are dammed and spread over the surrounding lowlands; they drain away during the rest of the year and are responsible for the general level of the river at Cairo during those months. The



Bahram. Famous racehorse, owned by the Aga Khan, which won for him the triple horse-racing crown (1935)

river banks are lined in parts by extensive forests of gum acacia, rubber creeper, ebony, and bamboo. Cotton-growing has been started in the district of Gezira. Khartum and Kodok (formerly Fashoda) are situated on the banks, and mark the N. and S. limits of the Bahr-el-Abiad. Lake No is 603 m. S. of Khartum. The elevation of this lake is 1,276 ft. and of Khartum 1,256 ft. above sea level. See Nile.

Bahr-el-Aswad. Arabic name for the Atbara (g.v.) or Black Nile.

Bahr-el-Azrek. Arabic name for the Blue Nile. A tributary of the Nile, about 1,000 m. long, it issues from Lake Tsana in Abyssinia, taking off the excess of water from the heavy summer rains, and flows ultimately N.W. to the White Nile at Khartum. With the Atbara it is responsible for the Nile flood which occurs between June and October. During these months the river is a raging torrent overloaded with silt; during the rest of the year it is almost dry. The chief towns on its course are Roseires, Senga, Sennar, and Wad Medani. Roseires is 402 m. S.S.E. of Khartum and 1,525 ft. above sea level, while Lake Tsana has an elevation of 5,756 ft. The Blue Nile, long considered the principal branch of the Nile, was ascended by James Bruce in 1770-71.

Bahr-el-Ghazal (Arabic, river of gazelles). A tributary of the Nile. Flowing into that river at Lake No, 603 m. S. of Khartum, it

receives several tributaries and drains the country S. of Darfur. It is a sluggish river and formerly was frequently blocked with masses of sudd (decayed water-plants), but from the earliest years of the 20th century successful efforts have been made to keep the channel open.

Bahr-el-Ghazal. Province of the Anglo-Egyptian Sudan. Bordering on the Ubangi-Shari-Chad territory, the Belgian Congo, and the Lado Enclave, it has an area of 114,100 sq. m., and is traversed by many rivers running from the Congo-Nile watershed towards the Nile. The headquarters of the prov. are at Wau, 898 m. S.S.W. of

Khartum on the Bahr-el-Ghazal, and 295 m. from Lake No. The forests of the province yield large quantities of rubber of excellent quality. Before the rise of the Mahdi it was held by the Egyptian government, when an attempt was made to suppress the slave-trading activities of Zubeir Pasha.

The task of restoring order was given to Romolo Gessi Pasha in 1878, and after his death, April 30, 1881, to Frank Lupton, who in 1884 had to abandon the prov. In 1898 the Egyptian flag was again hoisted. The prov., depopulated during the regime of the Mahdi, is peopled by various tribes, including the Niam-Niam or Zande (plural Azande), who inhabit the hilly country of the southern plateau, and the different Dinka clans. The territory was administered for a few years by the Belgian Congo on lease, but this was abrogated by the British government in 1906.

Bahr-el-Jebel (mountain river). Arabic name of the upper Nile applied to that portion of the river between Murchison Falls and Lake No. For the last 800 m. of its course it flows through almost level country in constantly decreasing volume; part of the water evaporates, much of it flooding and turning the neighbouring country into marsh. Rejaf is 493 m. upstream S. of Lake No and its altitude is only 922 ft. higher. The stream branches into many channels, mostly short, except the most easterly, the Bahr-el-Zeraf. See Nile

Bahr-el-Yemen. Arabic name for the Red Sea (*q.v.*).

Bahr-Lut. Arabic name, meaning Sea of Lot or Dead Sea (*q.v.*).

Baiae (mod. *Baia*). An ancient Italian town, in Campania. Situated on a bay 10 m. W. of Naples, its natural beauty and hot sulphur springs made it a favourite resort of the Roman emperors and the wealthy. Here Julius Caesar, Marius, Nero, and Alexander Severus built villas, and Tiberius and Hadrian died. In Roman times it was notorious for its luxury and immorality. It afterwards fell into decay, and is now only a miserable village. It contains remains of three Roman baths, once wrongly identified with parts of temples.

Baidyabati. Town of India, in Bengal. Close to the Hooghly river, 15 m. by rly. N. of Calcutta, it is a market town and manufactures jute and hempen ropes.

Baikal (Mongolian *Dalai Nor*). The largest fresh-water lake in Asia and tenth largest in the world. It is in the S. of the E. Siberian prov. of Russia, enclosed by the Baikal Mts., a spur of the Sayansk Altai. It is 390 m. long, from 18 m. to 60 m. broad, and covers an area of 13,250 sq. m.; its altitude is about 1,560 ft. above sea level, and soundings have shown a maximum depth of over 5,000 ft. The Selenga is the largest of the many rivers flowing into it, the Lower Angara carries away its outflow to the Yenisei, and of several islands on its surface Olkhon is the most considerable. Salmon, sturgeon, seals, and herrings are largely caught by the Buriats and Tunguses who inhabit the shores, and oil is extracted from the golomynka (*Callionymus baikalensis*), a fish peculiar to the lake. The construction in 1904 of a line skirting the S. end of Lake Baikal completed the Trans-Siberian Rly.

Bail (Lat. *baulare*, to carry, take charge of). When a person has been in custody, and is released for a time, but is bound to come up to answer the charge at a future date, very often one or more persons undertake, under a pecuniary penalty, that he shall be forthcoming at the proper time. This is called admitting to bail. The surety or sureties have to sign a recognizance binding themselves to pay to the king the sum named if the accused absconds. In such an event the bail is said to be estreated.

In amount bail ought not to be excessive; and when an inferior magistrate refuses to grant bail, a

judge of the high court may do so on a proper application. Bail is also used in Admiralty proceedings. When a ship or cargo is arrested, the owner thereof can have it released on finding bail not exceeding the amount of the property arrested or the amount of the claim, whichever is the smaller.

The term is applied to the persons who stand security and also to the amount of the security.

Baildon. Urban dist. in the W. Riding of Yorkshire, England. It is $4\frac{1}{2}$ m. N. of Bradford, has a rly. station, and is a centre of chemical manufactures. Near is Baildon Hill, with old entrenchments. Pop. 7,794.

Baile Atha Cliath. Erse name for the city of Dublin (*q.v.*).

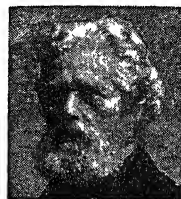
Bailey (late Lat. *ballium*, wall). In architecture, the court of a feudal castle between the outer wall and the keep. The term was originally applied to the wall enclosing such a court. In a fully developed Norman stronghold there were an outer and an inner bailey; the outer comprised the stables and outhouses of the stronghold, and was separated from the inner by a fortified wall with a gate-house; the inner bailey was the area within which stood the keep. See Castle.

Bailey, SIR ABE (1864-1940). S. African financier. He was born in S. Africa, Nov. 6, 1864, and educated in England. Returning to S. Africa, he became interested in the gold and diamond industry at Johannesburg. For his share in the Jameson raid (*q.v.*) he was sentenced to two years' imprisonment, and during the S. African War he served on the British side. A well-known owner of racehorses, he was knighted 1911 and created a baronet 1919. He married Mary Westenra (b. 1890), daughter of the 5th Lord Rossmore, afterwards famous as an airwoman. Sir Abe died Aug. 10, 1940. He had provided in his will for the establishment of a trust of £250,000 to be called after his name. The chief objects of the trust were to further the progress of the S. African people of British and Dutch stock, and the encouragement of Afrikaans (*q.v.*) in all English-speaking schools in the Union.

Bailey, HENRY CHRISTOPHER (b. 1878). English author. He was born in London, April 1, 1878, and was educated at the City of London School and Corpus Christi College, Oxford. He was, 1901-46, on the staff of the Daily Telegraph. He became well known for his detective novels, especially the

series dealing with the adventures of Mr. Fortune. As an undergraduate he made a reputation by an historical novel, *My Lady of Orange*, and followed this with several others in the same genre.

Bailey, PHILIP JAMES (1816-1902). British poet. Born at Nottingham, April 22, 1816, son of Thomas Bailey, the editor and proprietor of the Nottingham Mercury, he was educated at Glasgow. Called to the bar at Lincoln's



Philip James Bailey
Elliott & Fry

Inn in 1840, he never practised. Meanwhile, resolved to write his own version of the Faust legend, he had settled down in 1836 at his father's residence at Old Basford, near Nottingham, and in three years produced his masterpiece, *Festus*. Published anonymously by Pickering in 1839, *Festus* had an enormous vogue for many years. But revisions, additions, and the incorporation of later works, *The Angel World*, 1850, and the *Universal Hymn*, 1867, which swelled the bulk of the book and swamped its poetry in dull theology and obscure metaphysics, diminished its original popularity. He died at Nottingham, Sept. 6, 1902.

Bailey Bridge. Device used extensively by British and Allied armies in the Second Great War. Invented by Sir Donald Bailey, of the ministry of Supply, it was designed to cross gaps up to 240 ft. in length without the use of pontoons or supports. The bridge is built up of 10-ft. welded steel lattice-work panels. The panels, which are carried ready assembled in 3-ton lorries, are fitted with handles so that they can be lifted by six men. The panels are locked together with 6-lb. pins, and support the wooden roadway, which is laid as the bridge is assembled. Road guides serve the dual purpose of keeping the traffic central and holding down the deck planking. Two footways for infantry are carried outside the roadway, so that there is no confusion between foot and



H. C. Bailey,
English author

wheeled traffic. The bridge can be constructed with single panels and single tiers so as to take moderately heavy traffic immediately. Additional panels and tiers to increase the load capacity can be added while the bridge is in use. The heaviest type of Bailey bridge, which consists of three tiers of panels and is provided with cross-struts on the top tier, can carry the largest tanks.

The bridge is built on shore in 10-ft. lengths complete with roadway, and is then pushed forward on rollers almost to the point of balance, when the next section is added and the bridge pushed forward again. A false nose is fitted to the heavy section, and when this has crossed the gap it gives support while the final

of the rivers in the Italian and Burma campaigns, and they carried Allied infantry and armour across the Rhine. Under the name of the panel bridge, the U.S. army adopted the Bailey bridge, and components of British and American-made bridging became interchangeable. *See* Bridge; Pontoon.

Bailie. Scottish form of the word bailiff, signifying a high municipal officer. A bailie of a corporation is, by virtue of his office, a justice of the peace, and is exempt from serving on juries. The bailie of Holyrood, who was appointed by the duke of Hamilton, had jurisdiction within the precincts of the sanctuary.

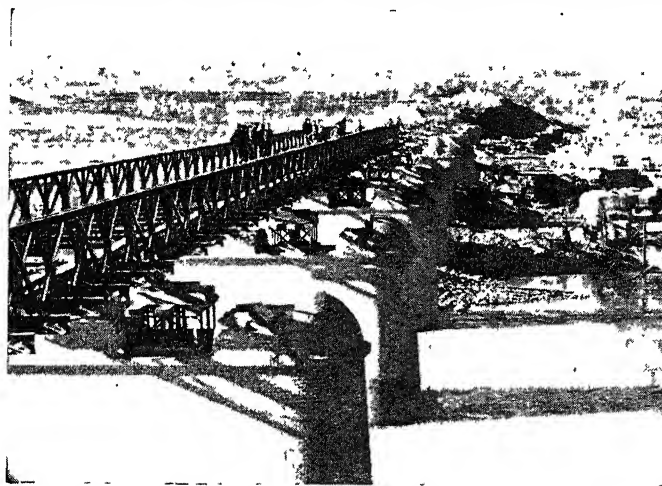
Bailiff (Lat. *bairulus*, carrier, person in charge). Name given to various officials. It was first ap-

plied in England to the chief officer of a hundred, and also to the king's servants generally, *e.g.* the high bailiff of Westminster and the bailiff of Dover Castle. Lords and others also began to have their bailiffs, and on manors the name was given to an official who looked after the lord's interests.

The word is now applied to an official employed by a sheriff to serve writs, carry out distrainments, make arrests, collect fines, summon juries, and perform other work of that kind. Every county court has a high bailiff, and under him are bailiffs who do the work of the court. These bailiffs give sureties that they will execute their duties and are consequently called bound bailiffs, or more popularly bum bailiffs. In the rural districts of England, a bailiff is one who looks after an estate or farm for another. In the Channel Islands the bailiff is a high official. In each of the larger islands he presides over the royal court and at meetings of the states. The French equivalent is *bailli*.

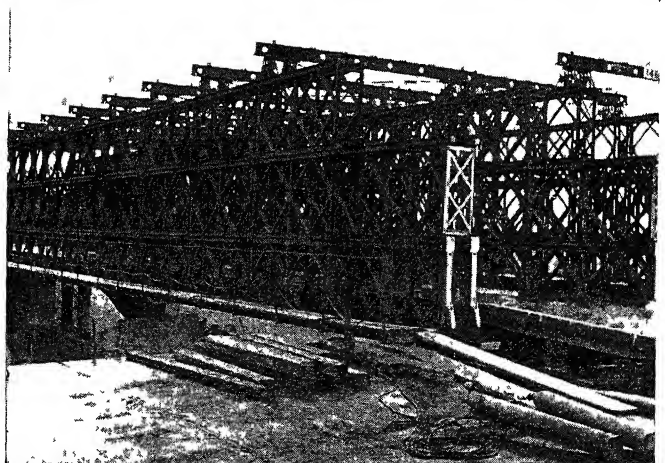
Bailiwick. The wick (Lat. *vicus*) or village of a bailiff, also the district over which his powers extend. Since the bailiff is actually the servant of the sheriff, the word refers generally to a county, this being the sheriff's district. It was applied to a town or city granted the privilege of being outside the control of the sheriff of the county.

Bailleul. Town of France, in the department of Nord. It lies near the Belgian frontier, 46 m. by rly. S.E. of Calais, and before the First Great War, during which it suffered much damage, it had



panels are completed. The nose and rollers are removed before locking the bridge in position. Only 17 different parts are used in making the bridge proper, and another nine in constructing the supports on which it rests. Provided there is no great preparatory work in levelling ground, 40 men can bridge a 240-ft. gap in six hours. During the 1939-45 campaigns Bailey bridges, long, short, easy or difficult, averaged not more than 24 hours in construction, even under shellfire.

Using pontoons or the supports of a bridge that has been destroyed the Bailey bridge can cover almost any distance. One of the longest erected on piers was the 1,200-ft. bridge thrown across the Sangro river in Italy in Nov., 1943. The longest Bailey bridge on pontoons spanned the 1,096-ft. Chindwin in Burma in Dec., 1944. Bailey bridges were used to cross most



Bailey Bridge. This quickly built bridge consists of interlocking latticed panels of steel, used with or without supports. It proved invaluable in the Second Great War. Upper picture shows a 1,200-ft. bridge across the R. Sangro, Italy; lower, a three-tier type on the autobahn nr. Bielefeld, Germany

Photos British Official and "Flight"

woollen, cloth, and leather manufactures. Hops are extensively cultivated, and much lace is made in the neighbourhood. The town gave its name to the Baliol family. Captured by the Germans, April 15, 1918, it was regained by the British on Aug. 30, 1918. A remarkable war memorial was erected, representing a war-shattered church, with figure of an angel. In the Second Great War the town was in German-occupied France from May, 1940, to Sept., 1944.

Baillie, LADY GRIZEL (1665-1746). A Scottish poet. Born Dec. 25, 1665, she was the daughter of the Sir Patrick Hume who became 1st earl of Marchmont. In 1692 she married George Baillie of Jerviswood. This was the outcome of a romantic adventure, as Grizel, when a child, had been sent with a letter from her father to George's father, Robert Baillie, then in prison on the charge of complicity in the Rye House Plot. She was equally courageous in taking food to her father when he was in hiding from arrest, and spent some years in exile with him in Holland. Lady Grizel, who returned to Scotland after 1688, wrote both prose and verse, and some of her poems are in Allan Ramsay's and other Scottish collections. She died Dec. 6, 1746. From her daughter the earls of Haddington descend.

Baillie, JOANNA (1762-1851). British dramatist and poet. Born at Bothwell, Lanarkshire, she came to London when quite young, and was many years resident at Hampstead, where she died Feb. 23, 1851.

Her *Plays on the Passions*, three volumes, 1798, 1802, and 1812, violate the principles of drama by ignoring in tragedy external circumstances, and making the development of a single passion the whole story, but show great skill in delineation of character. *De Montfort* was produced at Drury Lane, 1800, with John Kemble and Mrs. Siddons in the chief rôles, and revived by Kean, 1821. The *Family Legend* was produced at Edinburgh, 1810, and at Drury Lane, 1815.

Baillie-Stewart, NORMAN (b. 1910). Former British army officer, sentenced to 5 years' penal servitude in 1933 for communicating military secrets to Germany.



Baillie
After Sir W. Newton

While awaiting trial he was popularly spoken of as "the officer in the Tower." On his release he lived in Austria and Germany, applying for naturalisation papers. He had not obtained these before the Second Great War began. Technically still a British subject, he then broadcast German propaganda, and for this was sentenced in Jan., 1946, to 5 years' penal servitude. His sentence dated from May, 1945, when he had been arrested, and he was released in May, 1949.

Bailly, JEAN SYLVAIN (1736-93). French scientist and revolutionary politician. He was born in Paris, gained a European reputation as an astronomer, and was a member of the three French academies, his greatest work being his *History of Astronomy*. On the outbreak of the Revolution he was elected president of the National Assembly and mayor of Paris, but incurred odium by allowing the soldiers to fire on the crowd in the Champs de Mars, July 17, 1791. He was arrested by the Jacobins and guillotined, Nov. 12, 1793.

Bailment. In law, the delivery of a chattel by one person, the bailor, to another, the bailee, to be handed over to a third person, or to be returned to the bailor in a certain event. Thus, a carrier is bailee of the goods carried, and a pawnbroker of the goods pawned. A borrower, except of money or consumable goods, is bailee of the goods borrowed.

In English law a bailee must not use the chattels bailed otherwise than in accordance with the contract. If he does, he may be liable to pay to the bailor the full value thereof. Nor must he damage the goods. If he is a bailee for valuable consideration he is liable for negligence. If he is a gratuitous bailee he is only liable for gross negligence. When a bailor lets out chattels on hire, they must be "as fit for the purpose for which they are hired as care and skill can render them." If not, and any injury is caused to the hirer, the bailor is liable in damages. A public carrier, e.g. a rly. company, is liable for damage to or loss of the goods carried, whether negligence is proved or not, unless there is an "owner's risk" contract, i.e. one limiting liability.

Bailly, EDWARD HODGES (1788-1867). British sculptor. A native of Bristol, where he began his professional career as a modeller in wax, when 19 years old he went to London, becoming a pupil of John Flaxman. In 1809 he entered the

Academy Schools, became A.R.A. in 1817, and R.A. in 1821. The duke of Wellington, Charles James Fox, Lord Mansfield, Byron, and others sat to him for either figure or bust, and the Nelson statue in Trafalgar Square and the sculpture on the Marble Arch, London, are his work. Eve at the Fountain, 1818, established his reputation. He died at Holway, May 22, 1867.

Baily, FRANCIS (1774-1844). A British astronomer. He was born at Newbury, Berkshire, April 28, 1774.



Francis Baily,
British astronomer

After being on the London stock exchange, in 1825 he retired with a fortune, and fitting up an observatory at his house in Tavistock Place, London, devoted himself to astronomical study. One of the founders and afterwards president of the Astronomical Society, he re-edited the *Star Catalogues of Ptolemy*, Tycho Brahe, Halley, Flamsteed, and others. His estimate of the weight of the earth is still accepted as a close approximation to the truth. The phenomenon since known as Baily's beads (*vi.*) was first observed by him. He died Aug. 30, 1844.

Baily's Beads. Phenomenon of an eclipse of the sun, discovered by Francis Baily at the solar eclipse of May 15, 1836.

At a total eclipse the moon gradually covers the sun's surface until only a thin crescent remains. If the moon were truly spherical this crescent would gradually shrink as totality approached. The moon's surface is, however, irregular: mountain peaks interrupt the crescent before geometrical totality, and sunlight shines through valleys after the theoretical instant of disappearance. At the last moment the appearance is of a number of bright points or "beads," the apparent size of which is magnified by irradiation (*q.v.*). A similar effect occurs at the end of the total phase as the sun reappears.

Bain, ALEXANDER (1818-1903). Scottish philosopher. He was born June 11, 1818, in Aberdeen, and was professor of logic and English



E. H. Baily,
British sculptor
R. M. Marks

literature in the university of Aberdeen, 1860-81, when he was elected lord rector.

Association is the foundation of his psychology. The external and internal worlds, object and subject, are correlated: things are given to us only in relation to our consciousness. There is no object without a subject, and conversely, we can only speak of a world presented to our own minds. All intellectual life is based upon association due to contiguity (contact in space and time) and similarity.

His chief works are: *The Senses and the Intellect*; *The Emotions and the Will*; *Logic*; *Mind and Body*. He died at Aberdeen, Sept. 18, 1903. *Consult* English Psychology, Th. Ribot, Eng. trans. 1873; *Autobiography*, 1904.

Baines, EDWARD (1774-1848). British journalist and politician. Born at Walton-le-Dale, in Lancashire, Feb. 5,



1774, and apprenticed to a Preston printer, he became proprietor of the *Leeds Mercury* in 1801, and made it the chief Liberal paper in Yorkshire.

He was Liberal M.P. for Leeds 1834-41. He wrote a *History of the Reign of George III*, 1823, and a *History of the County Palatine and Duchy of Lancaster*, 1836. He died Aug. 3, 1848, and was given a public funeral. His second son, Edward (1800-90), was M.P. for Leeds 1859-74, wrote *A History of Cotton Manufacture in Great Britain*, 1835, and a *Life of his father*, 1851, and was knighted in 1880.

Bairaktar, MUSTAPHA (1755-1808). Turkish statesman. Beginning life as a soldier, and so winning his surname of Bairaktar, or standard-bearer, he was made pasha of Rustchuk, and in 1808 took a leading part in the revolution at Constantinople in which the sultan, Mustapha IV, the nominee of the janissaries, was deposed. He was responsible for putting Mahmoud II on the throne, and became grand vizier. He desired to crush the janissaries, but failed, and killed himself while they were attacking the palace, Nov. 15, 1808.

Bairam OR **BEIRAM.** Turkish and Persian word for the Moslem three-day festival which succeeds the fast of Ramadan. The name is also given to the four-day festival celebrated seventy days later, in the last month of the Arabic

year, in memory of Abraham's sacrifice of Isaac.

Baird, SIR DAVID (1757-1829). British soldier. Born at Newbyth, Scotland, Dec. 6, 1757, he went to India as a captain in the 73rd regiment in 1779. In the attempted relief of Arcot the force to which Baird was attached was cut to pieces by the army of Hyder Ali, and Baird was held captive for over three years. In 1799, as a major-general, he led the detachment which stormed Seringapatam.

The expedition sent from India to Egypt to trap the French army left by Napoleon was under his command, and in 1801 he captured the popular imagination by his brilliant march from Kosseir across the desert to the Nile. Knighted in 1804, he was sent in 1805, as lieutenant-general, in charge of the expedition which took Cape Town in 1806. He bombarded Copenhagen in 1807, and was in the retreat to Corunna, 1809. He was made a baronet in 1810 and died Aug. 18, 1829.

Baird, DOROTHEA (1873-1933). British actress. She was born in Northumberland May 20, 1873. After gaining experience in Shakespearean parts in Ben Greet's company she made an instantaneous success as Trilby at the Haymarket Theatre in the dramatized version of Du Maurier's novel of that name. In 1896 she married H. B. Irving (*q.v.*) and acted in a number of her husband's productions in America and Australia. She was the original Mrs. Darling in Barrie's *Peter Pan*, 1904. In 1912 she left the stage to devote herself to infant welfare, and died at Broadstairs, Sept. 25, 1933.

Baird, JAMES (1802-76). Scottish ironmaster. His father, Alexander Baird, established himself in the rich Lanarkshire coalfield early in the 19th century, owned several mines, and started furnaces for dealing with the ironstone. After his retirement, James and his three elder brothers reorganized themselves as William Baird & Co., and eventually employed 10,000 men and produced from their 40 or 50 furnaces 500,000 tons of iron a year. From 1851 to 1857 James represented the Falkirk burghs in Parliament. He died June 20, 1876, leaving no children.

A great benefactor to Presbyterianism, his devotion to orthodoxy contrasted strangely with his unconventional speech and manners. He endowed schools, founded the Baird Lectures, and in the Baird Trust gave £500,000 to the Established Church of Scotland.

Baird, JOHN LOGIE (1888-1946). British television pioneer. The son of a Presbyterian minister, he

was born in Scotland and educated at the Royal technical college and Glasgow university. For many years he was engaged in important scientific experiments, giving his first demonstration of television on Jan. 27, 1926. The transmission of television across the Atlantic was achieved in 1928, and next year the B.B.C. began a television broadcasting service with the Baird system. Baird experimented with and developed colour television and gave a demonstration of television in relief and full natural colour, Dec., 1941. He also invented the Noctovisor, an apparatus for seeing in the dark by invisible rays, first demonstrated in 1926. Baird died at Bexhill, June 14, 1946. *Consult* Life, R. F. Tiltman, 1933.



J. L. Baird, British television pioneer

Baireuth OR **BAYREUTH.** Town of Bavaria, in Upper Franconia. Standing on the Red Main, about 60 m. by rly. N.E. of Nuremberg, it has an old church with tombs of the margraves, 15th and 18th century palaces, the old opera house, and modern public offices. It manufactures cotton and woollen goods, beer, spirits, bricks, and earthenware, and trades in grain. Until 1791 it was the chief town of a little principality ruled by margraves belonging to the Hohenzollern family, remains of whose residence here still exist. Baireuth was taken by the U.S. 11th armoured division April 15, 1945, after a period of bombardment owing to the garrison's refusal to surrender.

Richard Wagner lived and was buried here, as were Franz Liszt and Jean Paul Richter. The chief Wagner memorial is the theatre standing on a hill about a mile from the town, built, with the co-operation of Ludwig II of Bavaria, on lines suggested by Wagner. Here also is a training school for Wagner opera. Pop. 36,892.

Baireuth Festival. Musical festival held periodically in honour of Richard Wagner. The Festival Theatre was opened 1876 with a performance of the *Nibelungen Ring*. The second festival took place in 1882, when Parsifal was presented. Since then one has been held

nearly every year. Everything was directed towards perpetuating the ideas of Wagner, the orchestra being concealed, applause discouraged and ignored, and the staging designed to produce effects of mystery and power.

Bairnsdale. Town of Victoria, Australia. On the Mitchell river, 170 m. by rly. E. of Melbourne, it is a rly. terminus at the E. end of the Great Valley of Victoria. A tourist centre for steamer trips on Mitchell river and the Gippsland lakes, it is the coastal terminus of the road over the Australian Alps to the tourist resorts Omeo and Bright to the river Murray and New South Wales. It ships grain, fruit, etc., to Melbourne. Gold is mined in the vicinity.

Bairnsfather, BRUCE (b. 1887). British humorous artist. Born at Murree, India, the son of a soldier, he was educated at the United Services College, Westward Ho, and became a civil engineer. In the first Great War he went to France with the Royal Warwicks, serving there until the end of 1916, when he joined the staff at the War Office. He won a great reputation by his humorous sketches in black-and-white of life at the front, which first appeared in *The Bystander* and were afterwards published in volumes entitled *Fragments from France*. His creations, Old Bill and his two companions, figured in a play, *The Better 'Ole*, written by Bairnsfather and A. Elliot, 1917, and a silent film, 1924. Bairnsfather was attached to the U.S. army in Europe, 1942-44, publishing *Jeeps and Jests*, 1943.

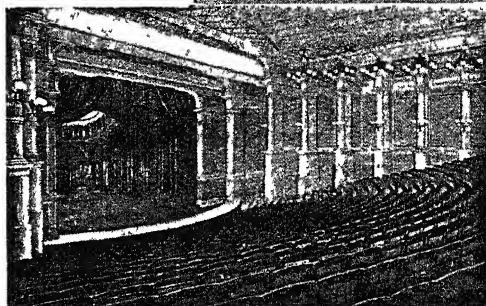
Bairstow, SIR EDWARD CUTHBERT (1874-1946). English musician. Born Aug. 22, 1874, he studied the organ in London under Sir F. Bridge. After holding appointments as church organist, in 1913 he went to York Minster. Durham University gave him a professorship in 1929, and in the same year he was president of the R.C.O. He was knighted 1932. A composer of church music, he died May 1, 1946.

Bait. For the various types of bait used by anglers, see Angling.

Baixo Alemtejo. Largest prov. of Portugal, with an area of 5,319 sq. m., and a pop. of 355,771. It is part of the old prov. of Alemtejo (q.v.), *baixo* meaning lower.

Baize (fr. *bai*, bay-coloured). Coarse, long-napped woollen or cotton cloth. It is used mainly for coverings, curtains, and linings, usually green or red. The name apparently alludes to the original colour, and, like chintz, is a plural

form used as a singular. The original baize was a finer and lighter material, and was used for clothing. Baize was first manufactured in England in 1561 by refugees from France and the Netherlands. The principal seat of the industry was



Bayreuth, Bavaria. Views of the interior and exterior of the festival theatre built for Richard Wagner. See p. 865

Colchester, where the old singular form of the word survived in the name of the Dutch Bay Hall.

Baja. Municipality of Hungary, in the county of Bács-Bodrog. It is on the Danube at the first place where the river is crossed by the rly. S. of Budapest, 66 m. by rly. E. of Ujdombovár on the main line Budapest-Fiume, and is a converging point for the rlys. from the S. and E. across the Alföld (q.v.). It makes alcohol and trades in grain and swine. Of the population four-fifths are Roman Catholic Magyars. Pop. 27,940.

Baja California. Mexican name of the state described under California, Lower.

Bajan or **BEJAN.** Name given in various medieval universities to new undergraduates or freshmen. Surviving in the universities of St. Andrews and Aberdeen, it is supposed to come from the French *bec jaune*, yellow beak or young bird. The university of Paris had an abbot of the bajans in the 15th century.

Bajaur. Dist. of Pakistan. On the Afghan border of the North-West Frontier province, it has an area of about 375 sq. m. It came under British protection as a result of a conference in 1893 between the ameer of Afghanistan and Sir M. Durand. The Region has iron ore deposits.

Bajocian. In geology, name applied to the lower portion of the Middle Jurassic rocks of

Parkinsoni and Marchisonae.

Bajus or **DE BAY, MICHAEL** (1513-89). Flemish theologian. He was born at Melun, and was educated at Louvain, where in 1541 he became head of one of its colleges, and in 1544 professor of philosophy. He represented Louvain at the council of Trent in 1561 and was chancellor when he died, Sept. 16, 1589.

His system of theology, called Baianism, presented the doctrines of man's original innocence, fall, and redemption in phraseology that was condemned by Popes Pius V and Gregory XIII. Jansenism was a direct result of his teaching.

Bakalahari (Kalahari-people). Bantu negroid tribe in the Kalahari veld, South Africa. They may have descended from the old Batau (lion-people), the earliest Bechuana to cross the Zambesi. They still display their racial aptitude for cattle-rearing and agriculture.

Bakalai. Bantu negroid tribe S. of the Ogowe, French Equatorial Africa. Immigrant from the S.E., they formerly practised slave-raiding. Their native copper and iron work is decaying. The chief traders of the equatorial coast, their Bakele speech is widespread. See Bantu.

Bakel. Fortified town of Senegal, French W. Africa. On the left bank of the Senegal, about 280 m. E.S.E. of St. Louis, it was founded 1820 and is a caravan centre, trading in dates, rice, cattle, ivory, and gold-dust.

France, derived from Bayeux, near Caen. The equivalent of the inferior oolite series of Britain, it consists mainly of oolitic limestones, white and ferruginous, with a characteristic ammonite-fauna including the zone-species

"**Bakelite.**" Proprietary name of a synthetic resin made from phenol and formaldehyde, invented by Leo Baekeland (1863-1944), a Belgian-American, in 1909. As the result of chemical combination a hard amber-coloured material is produced, soluble in alcohol and fusible at about 120° F. At a higher temperature the material becomes insoluble but remains fusible. It is ground into powder to serve as a moulding material; an inert filler such as wood flour is incorporated, and suitable colouring matter is added. The powder can now be pressed in heated moulds to any desired shape, and at a temperature of about 350° F. it becomes hard and infusible. It is termed a thermo-setting plastic, since it sets under the heat-and-pressure operation, and cannot thereafter be melted. Until about 1920 "Bakelite" held the field for its purpose; later other artificial resins were discovered, some of them of the thermo-plastic class, which could be moulded at high temperatures but did not then undergo such chemical change as to make them infusible. "Bakelite" can be made into varnishes or cements. A laminated material can be built up of fabric impregnated with the soluble "Bakelite" and then processed to form a sheet having the same characteristics as moulded powder products. "Bakelite" is used for small fancy articles, for electrical smallware and for such articles as door knobs. See Plastics; Resins, Synthetic.

Baker. Lake of North-West Territories, Canada. It is the lowest of an extensive system of lakes and rivers, the chief of which are the Dubawnt and Kazan, both of which enter the lake. The whole forms the N.W. corner of the drainage area of Hudson Bay (approx. 100,000 sq. m.), into which the lake outflows by Chesterfield Inlet. Its area is 1,029 sq. m.

Baker, Mount. Volcanic mt. of Washington, U.S.A., W. of and detached from the Cascade range. Snow-capped and covered with forests, it is 10,827 ft. high. There were serious eruptions in 1854-55, 1870, and 1880.

Baker, Sir Benjamin (1840-1907). British civil engineer. Born at Keyford, Somerset, March 31, 1840, Baker served as an apprentice at the Neath Abbey Ironworks and, having gone to London, in 1861 joined the staff of the engineering firm, under Sir John Fowler, of which he rose to be a partner in 1875. He was actively concerned with Fowler in

the construction of the London underground rlys., 1861-69, the Forth Bridge, 1883-90, and the London tube rlys. In Egypt he was consulting engineer for the dam at Assuan, 1898-1902, and similar enterprises, and he designed the special vessel that carried Cleopatra's Needle to London. In later life he was associated with Sir J. Wolfe Barry, and worked on docks, bridges, etc., at Avonmouth, Barrow, and elsewhere. He was created K.C.M.G., 1890, and died May 19, 1907. He is commemorated by a window in Westminster Abbey.

Baker, Henry (1698-1774). British scientist. He was born in London, and received from the Royal Society the Copley medal for his researches on saline particles. The Bakerian lecture, founded by him, commemorates his name. His acquaintance with scientists abroad led him to introduce the rhubarb plant into England. He was also the inventor of a system of teaching deaf mutes. With Daniel Defoe, whose youngest daughter he married, he issued in 1728 the Universal Spectator and Weekly Journal, adopting the pseudonym of Henry Stonecastle.

Baker, Sir Herbert (1862-1946). English architect. Born June 9, 1862, he was educated at



Sir Herbert Baker.
English architect

Tonbridge, became an architect, and went in 1892 to S. Africa, where he started to practise his profession. The buildings designed by him in S. Africa include cathedrals in Cape Town, Johannesburg, and Pretoria, Groote Schuur, for Cecil Rhodes, Government House at Pretoria, and the Rhodes Memorial on Table Mountain. He returned to England in 1913, and was architect of the Bank of England, Rhodes House at Oxford, S. Africa House, India House, the Church House in London, and the Winchester College war memorial. He was also associated with Sir Edwin Lutyens in the designing of New Delhi. He was knighted in 1926 and made an R.A. in 1932. He died Feb 4, 1946.

Baker, Sir Richard Chaffey (1842-1911). Australian statesman. Born June 22, 1842, at Morialta, S. Australia, he was educated at Eton and Trinity College, Cambridge, and afterwards called to the bar. Returning to his home

and entering political life, he was made attorney-general of S. Australia in 1870, and minister of justice and education in 1884. From 1893 to 1901 he was president of the legislative council. Baker, who was knighted in 1895, took part in the formation of the Commonwealth, and became the first president of its senate, 1901. He resigned in 1906 and died March 18, 1911.

Baker, Sir Samuel White (1821-93). British explorer. Born in London, June 8, 1821, the son of a West India merchant, he was in Ceylon from 1845 to 1855, and in 1859-60 superintended the construction of a railway across the Dobrudja.



Sir S. W. Baker,
British explorer

In 1861, accompanied by his wife, a Hungarian, Baker started from Cairo on a journey of exploration into Central Africa, chiefly with a view to discovering the sources of the Nile. After exploring the Atbara and the tributaries of the Nile, he proceeded southwards, and at Gondokoro, Feb., 1863, met Speke and Grant. Hearing from them of the supposed existence of another immense lake besides Victoria Nyanza, which they had discovered, Baker proceeded on his journey, and on March 14, 1864, sighted the new sheet of water, which he called Albert Nyanza. He returned to Khartum in May, 1865, and in 1866 he was knighted.

In 1869 he was commissioned by the khedive and with the rank of pasha organized an expedition to the Upper Nile to suppress the slave trade and open up the country. He achieved considerable success, and in 1874 returned to England. Baker's remaining years were spent in travel in Cyprus, India, and Japan. As a hunter of big game in every country he visited he was without a rival. He died at Sandford Orleigh, Devonshire, Dec. 30, 1893. His works include: The Albert Nyanza, 1866; The Nile Tributaries of Abyssinia, 1867; Ismailia, 1874; Wild Beasts and Their Ways, 1890.

Baker, Valentine (1827-87). British soldier, also known as Baker Pasha. Born April 21, 1827, at Enfield, a younger brother of Sir Samuel Baker, he began his military career as an ensign in the Ceylon Rifles, and after serving in the Kaffir War, 1852-53, and at

the siege of Sevastopol, 1854-55, he became known as an authority on cavalry tactics. By 1874 he was assistant quartermaster-general at Aldershot.

Dismissed from the army as the result of his conviction, Aug. 2, 1875, on a charge of assault, he took service under the sultan on the outbreak of the Russo-Turkish War of 1877-78, and at Tashkessan saved the situation by a skilfully conducted rearguard action. In 1882 he entered the Egyptian service and was in command of the police until his death at Tel-el-Kebir, Nov. 17, 1887. His writings include *Clouds in the East*, 1876; *The War in Bulgaria*, 1879.

Bakerloo. Name popularly given to the London electric underground railway from Baker Street to Waterloo. The first section of the line was opened in 1906; later that year it was extended S. to the Elephant and Castle. Extensions were made N. to Watford in 1917 and to Stanmore in 1939. The Bakerloo was controlled from 1933 by the L.P.T.B., from 1948 by the London Transport Executive. Brit. Rlys.

Bakers Company, THE. London city livery company. A company of White Bakers existed in



Bakers' Company arms

1307, the Guild of White and Brown Bakers was incorporated in 1509, and a separate charter was granted the Brown Bakers in 1622, but the two were united again in the second half of the 17th century. The present administration of the company dates from 1874. Bakers' Hall, Harp Lane, Great Tower Street, E.C., residence in 1435-46 of John Chichele, chamberlain of London, was burnt in 1715, rebuilt 1719, and in 1825 restored under John Elmes. It was totally destroyed by bombs in the Second Great War.

Bakersfield. City of California, U.S.A., the co. seat of Kern co. On the Kern river, which supplies power for factories, it is 168 m. N.W. of Los Angeles, on the Southern Pacific and the Atchison, Topeka, and Santa Fé rlys. It has oil refineries, railway carriage works, and foundries, and in the neighbourhood gold, oil, and natural gas are found. The city dates from 1872. Pop. 29,252.

Baker Street. London thoroughfare, Marylebone, W. It connects Orchard Street, Portman

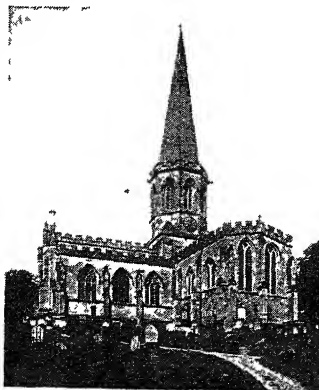
Square, with York Place and Upper Baker Street leading to Regent's Park, and was named after Sir Edward Baker, a Dorset neighbour of the Portmans. Bulwer Lytton was born and Grattan died in this street; Mrs. Siddons died in Upper Baker Street. The Portman, later Baker Street Bazaar, now the Portman Rooms, was the home of Madame Tussaud's waxworks, 1833-84, and of the Smithfield Club's annual show, 1839-61. Baker Street station, Metropolitan line, is a link between most parts of London and the line serving the residential districts of Buckinghamshire as far as Aylesbury. The street was much damaged by bombing, May 10-11, 1941. It has been made famous in fiction by Conan Doyle, whose Sherlock Holmes lived at the imaginary No. 221b.

Bakewell. Urban district and market town of Derbyshire, England. It stands on the Wye, 25 m.



Bakewell arms

N.W. of Derby by the railway and the London-Glasgow road A6. The cruciform church of All Saints, mentioned in Domesday, has a fine octagonal spire and contains monuments of the Vernon and Manners families. In the churchyard is a cross dating probably from the 8th century. The Lady Manners school was founded in 1637, and there are almshouses of earlier date. Bakewell has cotton and woollen industries established by Sir Richard Arkwright. It makes electric storage batteries. Chert is mined for use in the potteries. Its chalybeate spring and warm baths are noted. Haddon Hall, seat



Bakewell, Derbyshire. Church of All Saints; the original foundation is mentioned in Domesday

of the duke of Rutland, and Chatsworth, the seat of the duke of Devonshire, are in the vicinity. Market day, Monday. Pop. 3,500.

Bakewell pudding (or tart) is a sweet named from this town. The foundation of it is pastry which is covered first with jam, and then with a crust made of flour and yolk of egg. It is baked for half an hour and then garnished with castor sugar and white of egg beaten together into froth.

Bakewell, ROBERT (1725-95). British agriculturist. Born at Dishley, Leicestershire, he was the son of a farmer and himself followed the same calling. To the theory and practice of stock-breeding he brought unusual intelligence and foresight, and among his successes were heavier kinds of sheep and cattle and a special breed of black horses, useful for farm and army work. He established a club to secure greater purity of breed, and the offspring of his animals were highly prized by other graziers. He was equally successful in growing feeding stuffs. Bakewell's experiments were costly and he was bankrupt before he died, Oct. 1, 1795.

Bakhtegan OR NIBIS. Salt lake of Persia, in Fars prov. It is 60 m. long and averages 8 m. in breadth. It partly dries up in summer, when immense quantities of salt are obtained.

Bakhtiaris. Nomad tribe in the western uplands of the Bakhtiari range between Isfahan and Susa, Persia. Numbering about 250,000, they are allied to the nomad Lurs of Luristan. Horse-riding, frugal, independent hill-men, addicted to raiding the lowlands, they may represent in part the Median stock of Persia. See Kurds.

Bakhuisen OR BACKHUYSEN, LUDOLF (1631-1708). Dutch painter and engraver. He was born at Emden, Westphalia, Dec. 18, 1631, and at the age of 28 went to Amsterdam, where he became a pupil of the landscape painter Albert van Everdingen. But he virtually abandoned landscape in favour of shipping subjects. His work was quickly appreciated. He died at Amsterdam, Nov. 17, 1708.

Bakhuisen's method of study was very thorough; he hired fishermen to take him out to sea in a tempest, and exposed himself for hours observing effects of sea and sky from the shore. He is represented in the National Gallery by a picture of Dutch shipping; in the Louvre by The Dutch Squadron and other seascapes.

Baking (A.S. *bacan*). Method of preparing food by subjecting it to dry heat, usually in an oven. The latter should be heated to the appropriate temperature before the food is put in, and opening and shutting of the oven door avoided so far as possible. The top shelf is usually the hottest.

Meat should be placed on a grid in a deep dish and baked first in a very hot oven to seal up the surface and prevent too much of the juice escaping. When this has been done the heat must be lessened by means of the regulator found in modern gas and electric cookers, or by a damper in a coal range. This slower baking enables the meat to be cooked gradually all through. All kinds of pastry also need a very hot oven at first, to expand the air enclosed in the mixture, so that it raises and lightens the flour. If the temperature is not sufficiently high to set the pastry quickly, the air will escape and the pastry sink again and become heavy. Cakes should be started in a hot oven, and the heat decreased twice afterwards. Milk puddings are baked slowly on the lowest shelf.

Baking utensils include double baking pans for meat, patty-pans for mincepies, etc., raised pie moulds and cake tins, the bottom being removable, dishes and pans in fireproof earthenware and glass.

The term baking is also applied technically to the hardening or firing of tiles, earthenware, and bricks. *See* Brickmaking; Pottery.

Baking Powder. Powder used as a substitute for yeast in raising bread and cakes. It is composed of tartaric acid and bicarbonate of soda, mixed with ground rice or flour, in the proportions of 4 oz. each of the rice and soda to 3 oz. of the acid. When moistened, the acid acts on the bicarbonate of soda and produces carbonic acid gas, giving an effect similar to that of yeast.

Bakony Wald or **BAKONY FOREST** (Magyar, *Bakonyerdő*). Upland district of Hungary. Running N.E. from Lake Balaton to the Danube near Budapest, it is 70 m. long and 25 m. wide. In its dense oak and beech forests large herds of swine are fed, and marble is worked. The ridge rises sharply from the lake to an average level of 1,000 ft., and W. and N.W. of Veszprem isolated hills exceed 2,000 ft., the highest being 2,340 ft. The Danube makes a sharp turn to flow S. at Vazs between the end of the upland and the lower Carpathian hills to the N.; Buda

is on the edge of the ridge. There was heavy fighting here between Germans and Russians at the beginning of 1945.

Baksheesh (Persian, gift). Common Oriental term for a tip or gratuity. Samuel Purchas, the 17th century compiler of travel books, uses the word in the sense of "free" or "gratis." The slang word buckshee is a debased form.

Bakst, **LEON NICOLAIEVITCH** (1866–1924). Russian painter and theatrical designer. A pupil of the academy at St. Petersburg, he later studied in Paris. In 1906 he settled there and devoted his rare imaginative power to designing richly decorative stage costumes and settings, winning fame by his designs for the productions of the Diaghilev ballet, including *Les Sylphides* and *Aurora's Wedding*. He died Dec. 27, 1924.

Baktshi Serai or **BAKHTCHISARAI**. Town in the Crimean pen., R.S.F.S.R. It is 21 m. by rly. S. of Simferopol. Lying in a narrow and picturesque valley, it was formerly the residence of the Tartar khans of Krim, whose palace, built in the 16th century, is the chief object of interest. Tobacco is grown and there are soap and candle factories: sheep-skin coats are made.

Baku. Seaport on the Caspian Sea, capital of Azerbaijan S.S.R., and fifth city of Russia; pop. 809,347. It is on the Apsheron Peninsula, is connected by rly. with Batum, 559 m., and Poti, 535 m., on the Black Sea, and has steamer communication with Krasnovodsk, the terminus of the Transcaspian Rly., Astrakhan, and other ports.

A fine natural harbour, used also as a naval station, has made Baku a commercial centre for merchandise dispatched from the Transcaspian provinces and Persia; but it owes its great prosperity almost entirely to the vast petroleum deposits in the neighbourhood, the production of which is 75 p.c. of all the Soviets' output and in 1939 amounted to 23 million tons.

Besides the oil refineries, situated E. of the town, there are tobacco, flour, and chemical industries. A medical institute trains 2,500 students.

In 1918 a military expedition was undertaken by Great Britain to forestall possession of the Baku oil wells by German, Turkish, or Bolshevik forces. The city was held from Aug. 4 to Sept. 14, when its evacuation was compelled by Turkish pressure. At the Armistice of Oct. 30 the Turks agreed to Allied reoccupation, but it was evacuated in 1919.

The German drive into Russia to the Sea of Azov in the autumn of 1941, and the subsequent offensive against the Crimea, were directed primarily at securing the oilfields and pipelines at Baku.

Bakunin, **MIKHAIL** (1804–76). Russian anarchist. Born at Torjok, he belonged to the aristocracy, and served in the Imperial Guards, 1832–38. He began to associate with revolutionary leaders in Switzerland and Germany, taking part in the outbreaks of 1848–49 at Berlin and Dresden. His property had been confiscated in 1847, and in 1855 he was sent by the Russian government to Siberia, whence in 1859 he escaped to the U.S.A. and to London. In 1869 he founded the Alliance of Social Democracy in rivalry with Marx's International.

Whereas Marx urged the proletariat to achieve supremacy through political methods, Bakunin's programme involved the total overthrow of the state by armed insurrection. In 1872 Marx was successful in getting Bakunin expelled



Baku. Oil wells seen from the electric railway that runs from Baku through the oilfields to Sabounchi

from the Workmen's International Congress, and the latter retired to Switzerland, where he died, at Berne, June 13, 1876.

Bakwiri. Bantu-speaking negro tribes in the mountains N. of the Cameroons delta. They are lighter-hued than the Duala, their coastal neighbours to the S. Both migrated from the eastward, and have dominated the earlier negro population. Their village chiefs control the clans in warfare and the chase. Both peoples practise a secret drum-language. *See* Bantu.

Bala. Lake of Merionethshire, Wales. The chief source of the river Dee, it extends 4 m. S.W. from Bala town, and is about $\frac{1}{2}$ m. broad and 530 ft. above sea level.

Bala. Market town and urban district of Merionethshire, Wales. On the Dee at the N. end of Bala Lake, it is 14 m. S.W. of Corwen by railway. It has a theological college, a grammar school founded in 1712, breweries and flannel factories, and is a great resort for tourists and anglers. Market day, Thurs. Pop 1,395.

Balaam. Semi-heathen magician mentioned in the O.T. Despite divine warning, he was bribed by Balak, king of Moab, to curse Israel; but, against his will, uttered blessings and foretold Israel's triumph over Moab. While serving with Midian against the Israelites, he was slain in battle (Num 22-24; Micah 6; Rev. 2).

Balacava. Little village and harbour in Crimea, Russia. On the shores of the Black Sea, 8 m. S.W. of Sevastopol, it is famous for the charge of the British cavalry, Oct. 25, 1854.

The British and their allies were besieging Sevastopol, and holding the harbour of Balacava as a base. Around were hills defended by lines of earthworks. On Oct. 25 a Russian force, coming through a dip in the hills, attempted to relieve the fortress by breaking these lines. First they drove off some Turks on the heights and seized their guns; then their cavalry moved towards the plain, where the British horsemen were.

This plain between the sea and the hills is really two valleys, with a ridge between them, and, owing to their situation, they were called the North Valley and South Valley. In the South Valley was the Heavy Brigade under General Scarlett, and as the Russian horsemen advanced across the ridge the British crashed into them and drove them back in disorder. The Russians, in their retirement, passed close to the Light Brigade under Lord Cardigan, but no attempt was made to complete their rout. All this was done in a few minutes.

The Russians had retreated behind their own guns, and the Light Brigade were near the end of the South Valley, when Lord Raglan sent an order to Lord Lucan commanding the cavalry. "Lord Rag-

lan wishes the cavalry to advance rapidly to the front and try to prevent the enemy from carrying away the guns." Lucan questioned the correctness of the order, and had an altercation about it with Captain Nolan, who bore it. Raglan evidently meant the guns on the right—those captured from the Turks—not those at the end of the valley, but Lucan, misled by a hasty movement of Nolan's arm, took it to mean those at the end of the valley, over a mile away.

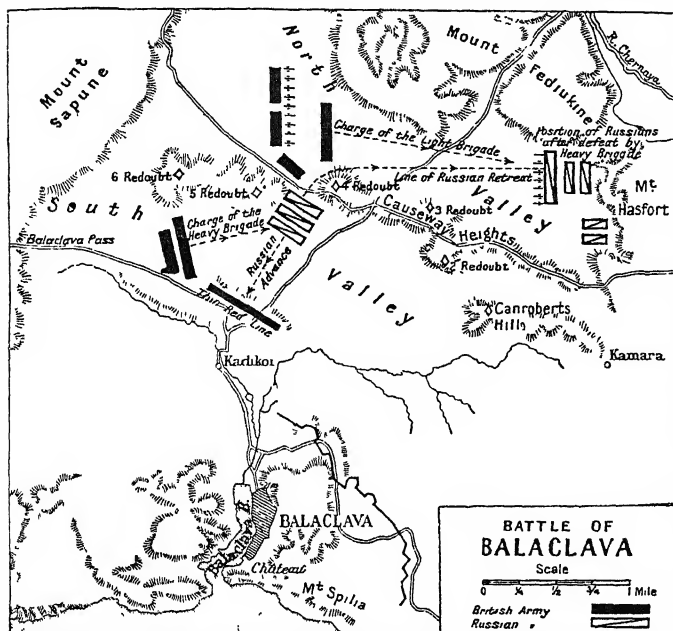
Lucan, therefore, gave the order to Lord Cardigan, who led the Light Brigade towards the Russian guns. As the men rode, the guns on either side of the valley opened fire on them, and soon those at the end did the same, making Tennyson's famous description literally accurate: "Cannon to right of them, cannon to left of them, cannon in front of them." However, some of the men reached their goal and cut down the gunners, but only a remnant returned. Others straggled in later, but the brigade had 110 killed and 134 wounded out of a total of 673.

Other occurrences of the day were the stand of the 93rd Highlanders, who broke up a Russian cavalry attack, and a charge by mounted Chasseurs d'Afrique which saved the Light Brigade from annihilation. The Russians kept the guns and the position. *Consult* *Invasion of the Crimea*, vol. v A.W. Kinglake, 6th ed., 1877.



Balacava. The charge of the Light Brigade, Oct. 25, 1854. One of the most spectacular episodes in the annals of the British army. Although originating in a blunder it furnished an imperishable tradition of obedience to orders.

R. Caton Woodville. By permission of H. Graves & Co.



Balaklava. Map of the Crimean battleground, showing the relative positions of the forces and lines of the charges of the Light and Heavy Brigades

Balaklava Helmet. Woollen headgear knitted in one piece and pulled over the head, providing a warm covering both for day wear in cold climates and for sleeping out in the open. These helmets were first worn in the Crimea, and vast numbers were supplied to British troops during the First and Second Great Wars.



Balaklava helmet

Balafré, LE (Fr., the scarred). Nickname given to Francis, duke of Guise (*q.v.*), from a wound on his cheek received at the siege of Boulogne in 1545; also to his son Henri; also to Ludovic Lesly, in Scott's *Quentin Durward*.

Balaghat (above the Ghats). Division, district, and town of India, in the Central Provinces. The district, a lofty plateau 3,132 sq. m. in extent, and covered with forests, is mainly waste land and has few roads. The town pop. is composed mostly of Hindus.

Balakirev, MILI ALEXEIVITCH (1836-1910). Russian composer. Born at Nijni-Novgorod (Gorky), Dec. 31, 1836, he was a founder of the national school of Russian music. He started the Free School of Music at St. Petersburg (Lenin-

grad) in 1862, and became director of the imperial chapel in 1869. Usually brilliant in scoring, his works include 30 songs, two collections of folk and national songs, two symphonic poems, Russia and Tamara, several overtures and one symphony for orchestra, and a number of pianoforte pieces. He died at St. Petersburg, May, 1910.

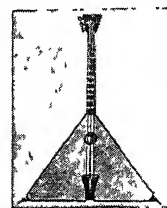
Balalaika. Popular Russian musical instrument of the guitar type. It has a triangular body and two, three, or four strings, plucked with the fingers. See *Guitar*.

Balance OR SCALES (Lat. *bis*, twice; *lanx*, dish, plate). The most exact of the numerous weighing devices or instruments. For many purposes such instruments must possess extraordinary accuracy. The investment of enormous sums of money depends on the determination of small quantities of gold and other metals in various geological strata a question of life or death may depend on ascertaining the exact amount of a very small quantity of poison; the discovery of helium, argon, and neon was due to most accurate observations on the weight of the gases contained in the atmosphere. The discovery of the nature of atoms and the possibility of nuclear fission depended in part on the accuracy with which atomic weights had been determined. Modern scientific research, especi-

ally in the various divisions of chemistry, demands balances as sensitive and reliable as man can make them and such instruments have attained to a very remarkable degree of accuracy.

The manufacturers of a great number of chemicals must be continually taking samples of their products and analysing them, whether they are needed for fertilisers, dyestuffs, drugs, or other purposes, and the manufacturers therefore maintain well-equipped chemical laboratories and large staffs of competent analysts. So, too, those engaged in the manufacture of medicinal products, of foodstuffs and infant foods, and those engaged in the study of the problems of nutrition and the ever growing science of bio-chemistry, are obliged to make use of the best scientific appliances, including balances. Public analysts and all others engaged in chemical research must be provided with the best instruments.

A modern balance consists of a rigid metal framework, that is in essence a double lever of two equal short lengths of metal, balanced on a knife-edge of agate; on another agate knife-edge at each end of this rigid framework is suspended a metal pan; into one of these the object to be weighed is placed; in the other pan a number of very carefully prepared weights are placed until an exact counterpoise is obtained. A long metal pointer is rigidly attached



Balalaika, Russian musical instrument

to the movable framework: when the weights in the two pans are exactly equal the pointer is exactly vertical and the pointer is sometimes fitted with a small mirror so that the degree of departure of the pointer from the vertical is greatly enlarged on a suitable screen.

The weights used are the gram and its multiples and decimal fractions. The gram weight and its multiples are usually made of brass, lacquered for ordinary use but platinised for very accurate use. The fractions of a gram are made of platinum, gold alloy, nickel-silver, or aluminium.

A graduated horizontal rod of metal is attached to the mechanism of the balance and on this bar a small stirrup of fine wire, called a rider, can be placed to make an

exact counterpoise; the nearer this rider is to the end of the bar, or lever, the more it deflects the pointer from the vertical and even when the counterpoise is not quite perfect a calculation can be made from the position of the rider on the bar and the angle the pointer makes with the vertical that will give an accurate indication of the weight of the body under examination. The rider is usually a small hook of platinum wire which can be shifted along the beam without the need of opening the glass case in which the balance is enclosed. The standard weight of the rider is one centigram, a hundredth part of a gram, and the graduation of the rod into ten parts will give weight-differences corresponding to milligrams or thousandth parts of a gram. Riders are also made of aluminium and special alloys.

Maintenance of a Balance

Mechanical means are adopted to arrest any movement of the balance during loading and unloading the pans and to support the framework and pans when the balance is not in use. Special precautions are taken to maintain the perfection of the balance; it should be supported on the most rigid table that can be obtained and should be kept in a cool room with a steady temperature. The balance is contained in a glass case and the person using it should keep as far away from the balance as possible so as to avoid any change in temperature. In some determinations it is desirable to resort to double weighing, that is, weighing the object in one pan and then repeating the weighing with the object in the other pan.

A balance capable of weighing 100 grams of material or less should weigh to an accuracy of about one ten-thousandth of a gram and larger balances will weigh to an accuracy of at least one part in a million of the maximum load. Allowance must, in some cases, be made for the buoyancy of the atmosphere.

For very precise weighings of small quantities of material several types of quartz micro-balances have been constructed for special work, for instance in measuring the density of gases. With such instruments it has been possible to detect a difference in weight of less than a millionth part of a milligram in a load of 250 milligrams.

Torsion balances make use of a different principle. The beam of the balance is suspended by a torsion thread so that it can

rotate about the axis of the thread. During the last fifty or sixty years threads of quartz, first made by Boys, have been used for this purpose. If a weight is hung on a twisted thread there is a force tending to untwist the thread and so rotate the beam. This rotation can be measured on a graduated scale and hence the weight can be calculated with a considerable degree of accuracy.

Stephen Miall, LL.D., B.Sc.

Balance of Power. The name given to a theory of international politics, more or less operative in Europe since the end of the Middle Ages, *i.e.* about 1450. It means that no one state shall be allowed to become sufficiently powerful to threaten the independence of the others. In other words, there must be sufficient strength, actual or potential, on the side of a country to balance that of its rivals. The foreign policy of Britain, more perhaps than any other country, has been influenced by it.

There was something in the nature of a balance of power in the relations of the city-states of ancient Greece to one another, but it disappeared during the centuries when Rome dominated the world. It was present in the minds of those who controlled the European states that came into existence in the 9th and 10th centuries, but its definite appearance is generally assigned to the early 16th century, and Wolsey is sometimes spoken of as having been the first to realize its importance. In his time Francis I of France and Charles V, ruler of Germany and Spain, were rivals, and Henry VIII, by swinging his weight from one to the other, kept the balance between them. His father, Henry VII, had done something of the same kind, and the idea was certainly present in the minds of Maximilian I, Ferdinand of Spain, and other astute contemporaries, as it was with those who ruled the little independent states of Italy.

With the revival of learning and the general widening of human interests that marked the age of Columbus, there came a greater knowledge of the affairs of other countries, and no ruler would willingly see a rival, or even a friend, reach a position of dominance if he could help it. This, indeed, had always been true, and in a sense the idea of the balance is as old as society itself. When the balance was fairly even the idea slumbered, passing only into the realm of actual politics as soon as one country threatened to disturb it.

The dominance of Spain was destroyed by the defeat of the Armada in 1588 and still more by her internal decay, and then in the 17th century came the rise of the French monarchy. Concurrently there came into existence, largely as the work of Grotius, some idea of international law, which depends for its validity on a balance of power or something very like it.

The danger to the balance of power that came from the France of Louis XIV led to a series of wars against that monarch and his successors, waged between 1667 and 1763 by groups of powers of which Britain was usually the chief. The policy of the balance was well illustrated in the wars carried on between 1740 and 1763. In the earlier ones Britain and Austria were allies; in the later one Britain joined Prussia, formerly the ally of France, who secured, instead, the aid of Austria. The danger was still more real from the France of Napoleon, but this, too, was overcome, and this phase may be said to have ended in 1815. The Congress of Vienna re-established something like a balance of power, the central feature of which was the existence of five great European states—Austria, Prussia, Russia, France, and Britain—but this took no account of forces outside Europe. However, for a time the balance was fairly maintained, for the troubles of the first half of the 19th century came rather from risings of the peoples, as in 1830 and 1848, than from wars arranged in the interests of statecraft.

German Menace Arises

The next serious threat to the balance came from the German Empire. With the unification of Germany following Prussia's victories over Austria and France, came the new menace. The result was the First Great War. Whatever the immediate *casus belli* for Great Britain, it is difficult to see how she could have avoided entering the struggle when the balance of power was so obviously in danger of destruction.

As a result of that grim and protracted struggle the conception of the balance of power was modified and the phrase itself outmoded. The treaty of Locarno (*q.v.*) was an ingenious attempt to achieve a three-sided equilibrium under penalty, one potential aggressor being confronted by an alliance of the other two parties to the treaty; but it was denounced by Hitler before it could be put to the test. In 1939 a

despairing attempt was made to restore a balance by the formation of a united front against the Axis powers. But all such actions were nominally taken within the framework of the League of Nations. This organization was designed to create an equilibrium not of one group of powers as against another but of one overriding world combination as against any single one of its component units that might dare to challenge its authority. Japan, Italy, and Nazi Germany in turn did so dare, and thereby demonstrated the League's practical weakness rather than any unsoundness in its theory.

Thus it has been twice amply demonstrated within the space of a lifetime that a balance between opposing groups is not of itself any greater insurance against the threat of aggression than is the maintenance of an extreme isolation; on the contrary, it tends to inflame suspicions and jealousies, leading to the probability of ultimate conflict.

Balance of Trade. Difference in value between a country's imports and exports of merchandise. When there is an excess of imports, the balance of trade is said to be adverse. This conclusion is not justified, as the returns are not sufficiently informative. Imports and exports of high significance are not included, and the method of valuing imports tends to exaggerate their relative importance. The old term is falling into disuse in favour of a modern balance of payments that will give a complete record of all financial transactions between residents and non-residents. Although the balance of trade of Great Britain has been consistently adverse, the balance of payments was just as consistently favourable until 1931 (war years excepted), when the world financial crisis caused it to fluctuate on the margin until the beginning of the Second Great War in 1939. Balances due to normal trade and long term investments automatically adjust themselves, but those due to short term lending and the transference of liquid capital in search of higher returns or safety cause crises which call for one or more of the following palliatives: exchange depreciation or control (making foreign exchange dearer); deflation (issuing less currency at home); devaluation (reducing gold in sovereign); reducing imports (tariffs); stimulating exports (subsidies), with the inevitable aftermath of distress and unemployment.

Balance-sheet. A document showing the financial position of a public or private company, business, society, club, or undertaking. A general balance-sheet consists of two parts or sides, each of which totals the same amount, hence the name. It has a statement of assets on the right or credit side, and one of liabilities on the left or debit side. The former gives the value of all goods and stock in hand, the amount of money due to the concern, and the value of all its property and investments, due allowance being made for depreciation, bad debts, etc. The debit side shows the money owing to creditors and other liabilities; on this side appears the amount of capital, really a debt of the business, and all reserve funds. The balance is completed by the amount of profit or loss. A balance-sheet is also accompanied by a profit and loss account, showing the results of the operations of the period under review.

The directors of a company within the Companies Act, 1948, must once in every year lay before the company a profit and loss account and balance sheet made up to a date not earlier than nine months before the company meeting and giving a true and fair view of the company's position. The balance sheet must contain the information required by the Eighth Schedule of the Act, including the following: details as to capital; preliminary expenses; discounts and commissions on shares and debentures; capital and revenue reserves; provisions; liabilities; assets, distinguishing fixed from current; goodwill, patents, and trade-marks; trade and other investments; options on unissued shares; arrears of fixed cumulative dividends; charges on assets to secure liabilities of any person

other than the company; the basis on which the company's liability to income tax is calculated. The corresponding accounts for each item in the previous year must be shown.

Companies with subsidiaries must in general present group accounts. These normally take the form of a consolidated balance sheet and profit and loss account, and must give a true and fair view of the affairs of the company and its subsidiaries.

All balance sheets must be signed by two directors (or the sole director), and their report must be attached. The auditors must report on the balance sheet, profit and loss account, and any group accounts. A copy of the balance sheet must be sent to all members of the company, whether the company is public or private, and must be annexed to the annual return sent to the Registrar of Companies. See Book-keeping; Company Law.

Balanchine, GEORGES (b. 1907). Russian dancer and choreographer. Born at St. Petersburg (Leninград), he studied at the imperial ballet school and the imperial conservatoire of music, after which he worked as a dancer and producer in various theatres. In 1927 he left Russia and joined the Diaghilev company, for which he produced a number of ballets, including *The Gods Go A-Begging*, *Cotillon*, and *The Prodigal Son*. After Diaghilev's death he left the company and produced ballets in Paris, Copenhagen, and the United States. Among his later works were *Concerto Barocco* and *Night Shadow*.

Balanophoraceae. Small family of leafless, succulent plants. The genus *Balanophora*, has eleven species. Parasitic on the roots of other plants, they are chiefly

BALANCE-SHEET AS AT JUNE 30, 1946

LIABILITIES	£	£	ASSETS	£	£
<i>Sundry Creditors</i>			<i>Cash</i>		
For goods . . .	2930		In hand . . .	10	
„ salaries and wages . . .	50		„ bank . . .	1000	
„ rent, &c. . .	20				1010
<i>Capital</i> . . .	10000	3000	<i>Sundry Debtors</i>		
			On open account . . .	2000	
			„ bills receivable . . .	500	
Profit transferred from Profit and Loss account . . .	1000		<i>Plant</i> . . .		2500
	11000				250
Less drawings . . .	500		<i>Buildings, &c.</i> . . .		7430
			<i>Office Furniture</i>		120
		10500	<i>Stock on hand</i> . . .		2190
		13500			13500

Balance-sheet of private business. Example showing how liabilities are set against assets to indicate the financial position

natives of hot countries. Like many other parasites, they are without any green colouring, being some shade of yellow or red. The simple flowers, usually unisexual, are produced in crowded heads a few inches above the ground. The plants attack the roots of trees and vines. The Japanese *Balanophora elongata* produces wax from which candles can be made.

Balapur. Town of India, in the Akola district of Berar. It is 12 m. W. of Akola, and is noted for its fort, completed in 1757 by Ismail Khan, the first nawab of Ellichpur. Near the town are the ruins of the palace built at Shapur by Akbar's son, Sultan Murad. Many of the people are Mahomedans.

Bala Series. In geology, the uppermost subdivision of the Ordovician System. It is so called from Bala in N. Wales, where rocks of this series are well developed. They consist mainly of slates, shales, and grits, with beds of volcanic ash, and at least two important beds of limestone. The Bala series was deposited during a period of intermittent volcanic activity, which made itself felt more particularly in the region of N. Wales.

The series, especially the limestones, contains a varied brachiopod and trilobite fauna as well as abundant remains of cystids. In addition to N. and S. Wales the rocks of this series occupy a large area in the S. of the English Lake district, and in the S. of Scotland exist in the form of black shales with a highly characteristic graptolite fauna. The Bala series is also represented in Scania and the Baltic countries, more especially in the Gulf of Finland and the valley of the Dniester, by trilobite and graptolite-bearing shales. In America the series is represented by the Hudson river or Cincinnati group, which comprises shales and sandstones that contain graptolites, trilobites, and brachiopods characteristic of the Bala rocks. See Caradoc Series; Cystidia.

Balasinar. Former state of India, now merged in Bombay prov. It had an area of 189 sq. m., ruled by a nawab. It was administered by the Baroda and Gujarat states agency 1933-44, and by the W. Indian states agency 1944-47. Balasinar, the former capital, is 50 m. N. of Baroda. Pop. 61,151.

Balasor. Coastal district and town of India, prov. of Orissa. The district has an area of 2,085 sq. m., and produces salt and rice. The town, the capital of the district, is 118 m. by rly. S.W. of

Calcutta; in 1633 it was a considerable port on the Burhabalang river. Later it had English, Dutch, Danish, and French trading factories, but the river-mouth has silted up so that the town is now 7 m. inland. Until 1947 the French owned 38 acres. The district is peopled mainly by Hindus.

Balas Ruby. In mineralogy, term wrongly applied to a rose-tinted variety of spinel (*q.v.*).

Balassagyarmat. Town and district of Hungary, in Nograd and Hont co. The town is on the river Eipel on the southern fringe of the Carpathians, 69 m. by rly. N. of Budapest. The pops. of town and district are three-quarters Magyar.

Balata OR SURINAM GUTTA-PERCHA. Substitute for gutta-percha, formerly used in making belting for machinery. It is made from a gum obtained from the bullet tree, *Mimusops globosa*, found in tropical America. As it contains more resin, it is inferior to gutta-percha (*q.v.*).

Balaton (German, Plattensee). The largest lake of Hungary. Lying 55 m. S.W. of Budapest at an alt. of 426 ft., it has a length of 50 m., maximum breadth of 10 m., and area of about 250 sq. m. or, with adjacent marshes, often inundated, 420 sq. m. Fed by over 40 streams, it has a depth of 20 ft., and discharges through the Sió and the Kapos river and canal into the Danube. The S. shore is low, the N. hilly and vine-covered. The waters normally are clear, though brackish, and during storms become bluish. They hold abundance of fish, particularly the fogash, a highly esteemed variety of perch. Steamboats ply on the lake. The scenery is picturesque, and the lake is famous in Magyar poetry and folk-lore.

Balawat. Ruined city 10 m. E. of Nineveh. There in 1879 the two-leaved door of an Assyrian palace was discovered by Hormuzd Rassam. It is 27 ft. high, of 4-in. cedar, each leaf being adorned with seven horizontal bronze bands 8 ft. long, 9 ins. wide. It is now in the British Museum. Each band bears a double row of scenes stamped in repoussé, depicting campaigns of Shalmaneser III, 858-823 B.C.

Balbi, GASPARO. Venetian traveller and merchant. He was a very wealthy dealer in jewels, and lived in India 1579-88. His Travels in the East Indies, 1590, was the first account of India beyond the Ganges, and, while it contains many incredible

stories, conveys much useful information, including an account of the Burmese kingdom of Pegu.

Balbinus, DECIMUS CAELIUS (d. 238). Roman emperor. He was one of the two emperors chosen by the senate in April, 238, as rivals to Maximinus, who had been selected by the soldiers on the Rhine. Balbinus, an orator and a poet, prepared to restore order in Rome, while his more warlike colleague Maximus Pupienus set out against Maximinus. Balbinus defeated the rebels and was about to march against the Goths when he and Maximus were killed in Rome by praetorian guards, Aug., 238.

Balbo, ITALO (1896-1940). Italian soldier and airman. Born June 6, 1896, he served as an officer in the Alpini during the First Great War, being twice decorated for bravery. After the war he joined the fascist movement and was one of the four leaders of the "march on Rome," Oct., 1922. He was appointed under-secretary of state for Air in 1926, and minister for Air in 1929. He was a skilled pilot and led several long-distance formation flights. In 1933 Balbo was promoted marshal and governor-general in Libya, which post he held at the outbreak of the Second Great War. On June 28, 1940, it was reported from Italy that he had been killed in an air battle over Tobruk, but the British foreign office denied that there had been any such battle. As Balbo had been opposed to the policy of Italian cooperation with Hitler, it was suspected that his death might have been contrived by the Italian government.



Italo Balbo,
Italian airman

Balboa. Silver coin. The monetary unit of the Panama Republic, Cent. America, it is the legal equivalent of the U.S. dollar, which equals two silver Panama pesos. It is named after the discoverer Vasco Núñez de Balboa, whose head appears on it.



Balboa, Panama
silver coin

discoverer Vasco Núñez de Balboa, whose head appears on it.

Balboa OR PORT OF ANCON. Port of Panama city. It lies at the base of Ancon Hill, at the Pacific end of the Panama Canal.

to the opening of which its existence is due. Its harbour is approached by a channel 4 m. long, 500 ft. wide, and 35 ft. deep at low water. There is no anchorage room, and vessels are moored alongside the wharves. Additional space has been provided for this purpose. The dry dock, which can accommodate the largest vessels, is 1,000 ft. long, 29 ft. deep at mean low water, and 110 ft. wide at entrance. The harbour is equipped with two floating cranes, coaling plant, and oil tanks with a capacity of 200,000 barrels. It is named after Vasco Nuñez de Balboa (v. i.). Balboa has a wireless station, telephone communication with Panama, Colon, and the Canal Zone, and rlys. connecting with Ancon and Panama.

Balboa, VASCO NUÑEZ DE (1475-1517). Spanish navigator and discoverer. In early life Balboa sailed to the New World and settled in Santo Domingo, but being obliged to flee from his creditors, he joined an expedition to Darien. Of this colony he became ruler. He was the first European to set eyes upon the Pacific Ocean, Sept. 25, 1513. He named there the Gulf of San Miguel, and took possession of the ocean for the Spanish king. He remained in Darien, but in 1514 was superseded as governor by Pedrarias Davila, by whom in 1517 he was beheaded.

Balbriggan (Gaelic, Brecon's town). Seaport and watering-place of co. Dublin, Eire. It is 22 m. N. of Dublin by railway, and has a coastguard station and a small fishing harbour. Its fine hosiery, muslins, calico, and cotton are so noted that the name Balbriggan is used to designate varieties of cotton-knit articles wherever they are made. Pop. 2,273.

Balch, EMILY GREEN (b. 1867). American economist. Born in Jan., 1867, she studied in Paris and Berlin. Her connexion with the Women's International League for Peace and Freedom began in 1919, as secretary; she became hon. president in 1936. Miss Balch was joint recipient of the Nobel peace prize for 1946.

Balchin, NIGEL MARTIN (b. 1908). For biography of this British writer, see N.V.

Balcon, SIR MICHAEL (b. 1896). British film director, born in Birmingham, May 19, 1896. The founder of Gainsborough Pictures, he became director of production for Gaumont-British Pictures, 1931-36, then producer for Metro-Goldwyn-Mayer. He returned to independent British production in

1938 and became director of Associated Talking Pictures and of Ealing Studios. His films include *Rome Express*, *The Good Companions*, *A Yank at Oxford*, *The Captive Heart*, *Hue and Cry*, *The Overlanders*, *Nicholas Nickleby*, *Scott of the Antarctic*, and war-time films for government depts. He was knighted 1948.

Balcony (Ital. *balcone*, projection). In architecture, an unroofed structure built out from a wall. Distinguished from a loggia, it consists of a floor and low parapet supported by brackets. In medieval times balconies adorned only palaces and other important buildings, and were generally built of stone or marble; but in the 18th century the use of iron for the parapet became common in France and Germany, and balconies constructed entirely of metal are now common. The cantoria inside Italian churches was a form of balcony, as also were the minstrels' galleries in the halls of castles and mansions. The interior balcony, more often alluded to as gallery, is a common feature of modern churches, and in theatres and other places of public entertainment. See Cantoria.

Baldacchino. Italian word for the canopy borne over the Host in processions of the Blessed Sacrament in the Roman Catholic Church. It consists of a rectangular framework covered with cloth of gold or white silk, and supported by four, six, or eight staves.

Baldachinum (Italian *baldacchino*). Eccles. term for the canopy over an altar. The word is derived from Baldacco, the Italian for Bagdad, which supplied the textile fabrics of which the later canopies were made. Erected to give dignity to the holy table, it was made originally of wood, stone, or metal, and generally supported on four columns. Its use is first mentioned in the 4th century. With the development of Gothic architecture the baldachinum was gradually displaced. The most magnificent baldachinum in the world is over the high altar in S. Peter's, Rome, executed by Giovanni Bernini for Pope Urban VIII.

Balder. Sun-god in Norse mythology. In the Icelandic Prose Edda, Balder is described as the beautiful, white, and gentle second son of Odin, and husband of Nanna, the moon goddess. His house in Asgard was Breidablik or Broad-Shining. Early in the Odinic reign he had dreams of evil, and his mother, Frigg, made all things, excepting the mistletoe, promise not to

harm him. Loki, the mischief-maker, having found this out, had a mistletoe twig magically turned into a dart. With this he went to the place where the gods were throwing weapons at Balder to prove his invulnerability, and persuaded Hoder, Balder's blind brother, to join in the game by throwing the mistletoe, and so Balder was killed. His body was put on a funeral pyre on a ship, and when Nanna saw it being pushed out to sea she fell dead of grief, and was laid beside him.

His spirit passed to the lower world, a place of bliss for the good and punishment for the wicked. Odin sent a messenger to Hel, the goddess of the lower world, begging Balder back, and she replied that if all Nature wept for him he might return. Loki, alone among the world's creatures, refused to weep, and thus Balder never returned, though he sent the magic ring of rejuvenation back to his father. See Mythology.

Baldness (*Alopecia*). Scarcity or absence of hair in human beings. A natural change usually associated with advancing years, it may also occur after acute illness; as the result of parasites such as ringworm; or of seborrhoea, an infection of the scalp. The cure of the cause with stimulating treatment of the scalp by massage and tonic lotions, results in the cure of relatively simple cases.

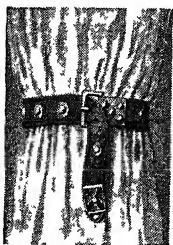
It is now recognized, however, that worry is a cause of baldness. Some nervous reflex would seem to starve the scalp by denying it a blood supply, and such cases must be seen by a psychologist. Diet in war years can also be blamed because of the absence of the Vitamin B complex; and of certain fats, for which reason avocado oil has been usefully added to cosmetic preparations. Some patches of baldness are of unknown origin and do not respond to any treatment. Premature baldness is essentially a disease of the male, and can begin very early in life with sexual maturity. This little understood condition must bear some relation to the male hormone acting on a predisposition of the victim.

Baldock. Urban district of Hertfordshire, England. It lies 37 m. N. of London and 5 m. N.E. of Hitchin by railway; it is also on the Great N. Road. The G.P.O. has an important wireless transmitting and receiving station here. Once a market town, it has a fine partly Norman church, S. Mary's. Near the town in 1923

a Roman cemetery was unearthed, yielding interesting finds which are now in the Letchworth museum. Pop. 3,171.

Baldovinetti, ALESSIO (c. 1427-99). Italian painter. Born at Florence and admitted to the guild of S. Luke in 1448, he is stated to have assisted Andrea del Castagno and Domenico Veneziano in the decoration of S. Maria Nuova (1439-53), but no trace of the work remains. Baldovinetti invented a new, but unsuccessful, method of mixing colours; hence most of his works are badly preserved or have perished. An Annunciation by him in the Uffizi Gallery and a Holy Trinity in the Academy at Florence reveal him as a not too skilful colourist. He was more successful in mosaic work, and restored the mosaics in the cupola of the baptistery of Florence cathedral. He died in the hospital of San Paolo at Florence, Aug. 29, 1499, and was buried in the church of San Lorenzo.

Baldric (Latin *balteus*, belt). A girdle or belt, now rarely used.



Baldric. Medieval girdle, usually made of leather

Usually of leather, it was worn sometimes hanging over one shoulder, across the breast and under the opposite arm, and sometimes round the waist. It was used to support a sword or bugle. The name was also given to the strap round the neck which held the shield.

Baldung, HANS (c. 1480-1545). German painter and engraver. He was a pupil of Albrecht Dürer at Nuremberg. An altar-piece of S. Sebastian, painted in 1507, which, formerly in the cathedral at Halle, passed into the Lippmann collection at Vienna, is the first extant painting ascribed to him. In 1509 Baldung settled at Strasbourg, where he died. His masterpiece is the chief altar-piece in the cathedral at Freiburg. His reputation rests otherwise chiefly on his designs for engraving.

Baldwin. Masculine Christian name. It was borne by a succession of counts of Flanders, two of whom were rulers of the Latin empire of Constantinople or Romania. This powerful family was founded by Baldwin I, called Iron Arm, who died in 879. His descendant, another Count Baldwin, was regent of France and took part in the in-

vasion of England by his father-in-law, William the Conqueror. Another family of this name, that of the counts of Boulogne, provided Jerusalem, after its capture by the Crusaders, with five kings.

Baldwin I (c. 1171-1205). Latin emperor of Constantinople or Romania. As the count of Flanders he took part in the crusade in which Constantinople was captured in 1204. He was chosen ruler of the new realm, which included only the city and a small district around it, and some Aegean islands. Taken prisoner by the Bulgarians while besieging Adrianople in April, 1205, he soon afterwards died in prison.

Baldwin II (c. 1217-73). Latin emperor of Constantinople or Romania. The son of the emperor Peter and nephew of Baldwin I, he became emperor in 1228. John of Brienne, king of Jerusalem, was chosen regent, and in 1234 Baldwin married his daughter. Neither John nor Baldwin was able to strengthen or increase the little kingdom. The latter's reign ended when Michael Palaeologus took Constantinople in 1261 and the Latin kingdom came to an end. See Romania.

Baldwin I (c. 1058-1118). King of Jerusalem. Of the family of the counts of Boulogne, Baldwin went with his brother Godfrey of Bouillon on the first crusade. Having left the main body, he made himself ruler of Edessa, and remained there until the death of Godfrey. Crushing the rival pretensions of Dagobert, he secured undisputed possession of Jerusalem, where he reigned 1100-18. He carried his arms as far as Egypt.

Baldwin II (c. 1070-1131). King of Jerusalem. The nephew of Godfrey of Bouillon, he went on the first crusade. In 1100 he was called to succeed another uncle, Baldwin I, as ruler of Edessa. In 1118 Baldwin again succeeded his uncle, this time as king of Jerusalem, adding much to the area and strength of his kingdom. He was constantly engaged in conflict with the Mahomedans, and was for some time their prisoner.

Baldwin III (1130-1162). King of Jerusalem. The son of King Fulk, he began to reign in 1143, but the real ruler until 1152 was his mother, Melisande. His ten years of personal rule were mainly occupied in fighting. He married Theodora, daughter of the East Roman emperor Manuel. The chronicler speaks highly of Baldwin's ability and knowledge.

Baldwin of BEWDLEY, STANLEY BALDWIN, 1ST EARL (1867-1947). British statesman. Born

Aug. 3, 1867, son of Alfred Baldwin, head of a large engineering firm, he went to Harrow and Trinity College, Cambridge. He did much to develop the family business, so that at his father's death on 1908 he controlled one of Britain's largest engineering firms, Baldwins Ltd. He succeeded his



Earl Baldwin.
British statesman

father as Conservative M.P. for Bewdley, Worcs., 1908, retaining the seat until his retirement and elevation to the peerage in 1937. He became parliamentary secretary to Bonar Law in 1916, financial secretary to the Treasury in 1917, a privy councillor in 1920, and president of the Board of Trade, 1921. His speech at a party meeting in Oct., 1922, played an important part in the immediate downfall of Lloyd George's coalition government, and Baldwin became chancellor of the exchequer under Bonar Law, succeeding him as prime minister in May, 1923.

For 14 years he played a leading part in the political life of the U.K. Appealing to the electorate for a mandate for a moderate protective tariff, Dec., 1923, he led his party to temporary defeat, a majority of 77 being converted to a minority of 103. Resigning Jan. 21, 1924, to give place to the first Labour government, he returned to the premiership after the election of Oct., 1924, with a majority of 227. His administration was confronted by grave problems, including relations with Soviet Russia, unemployment, and industrial unrest culminating in the General Strike (*q.v.*) of May, 1926. In 1929 he went to the country on a slogan of "safety first," and as a result was temporarily out of office, though surviving attempts by the popular Conservative press to oust him from the party leadership. The economic crisis of 1931 led to the formation in Aug. of a national government, and Baldwin served under Ramsay MacDonald as lord president of the council and lord privy seal. The Conservatives were predominant in the house, and Baldwin's influence in the government was thereby strengthened. On MacDonald's retirement, June, 1935, he became premier again for almost two years. This third and final premiership was marked by growing tension in Europe following the rise to power

of Hitler and Mussolini and their challenge to the League of Nations which Baldwin was pledged to support; also by the constitutional problem inherent in the abdication of King Edward VIII. Baldwin handled the latter problem with much skill and tact, almost single-handed in order to avoid the possible emergence of strong popular feeling; but events showed him to have been less successful in facing the threat from Europe.

Generally esteemed for personal integrity and a high sense of patriotism—his secret gift to the treasury in 1919 of one fifth of his total wealth was characteristic—he was criticised by opponents for an alleged slowness in appreciating the growing strength of the dictators and for failure to redeem his promise of an adequate air force for Great Britain. His defence was the prevalent state of public opinion as expressed in the so-called Peace Ballot (*q.v.*), 1935. On his retirement from political life, May, 1937, he was made an earl and a K.G. He died Dec. 14, 1947, and was succeeded by his son Oliver (*v.i.*).

Always an effective speaker on a wide range of subjects, not necessarily political, Earl Baldwin collected many of his speeches into volumes, including *On England, Our Inheritance*.

Baldwin, Oliver RIDSDALE BALDWIN, 2ND EARL (b. 1899). British politician. Son of the above Stanley Baldwin, he was born March 1, 1899, and went to Eton. Serving as lieut.-col. in the Armenian army, 1920–21, he was imprisoned in turn by Bolsheviks and Turks. Labour M.P. for Dudley 1929–31, and elected by Paisley in 1945, he was known as Viscount Corvedale from 1937 until succeeding in 1947 to the earldom. He was governor of the Leeward Is. from 1948. His publications include *Six Prisons and Two Revolutions*; *The Questing Beast*; *Unborn Son*; *Oasis*.

Bale (late Lat. *bala*, round body). Term for a canvas-covered package, generally hoop-bound and compressed. Packages of textile goods in bale canvas without hoops are known as trusses. The bale is a rough measure of the weight of textile raw materials. Raw cotton is bought and sold in quantities denoted as bales. The American cotton bale is 500 lb., Egyptian 700 lb., W. African 400 lb. The Australian bale of raw wool averages 330 lb., and the S. American wool bale 1,000 lb. The bale of raw jute is 400 lb.

Bâle. French name of a Swiss canton and city; in English, Basle; in German, Basel (*q.v.*).

Bale, John (1495–1563). English bishop and dramatist. Born at Cove, Suffolk. He went from the



John Bale, English bishop and dramatist

Carmelite convent at Norwich to Jesus College, Cambridge, where he became a Protestant and a vigorous controversialist. After holding livings in Suffolk, Hants, and Norfolk, he was made bishop of Ossory in 1552. He retired to the Continent, 1540–47 and 1553–58, and died a prebendary of Canterbury. Blending scholarship with scurrilous invective, Bale edited Leland, on two of whose works and his own study of monastic libraries he founded his Latin history of British writers, published in 1548–49 and 1557–59. His morality or interlude, *Kyng Johan* (c. 1548; ed. J. P. Collier, 1838), marks an important departure in the evolution of the English drama.

Balearic Isles (Span. *Baleares*, Lat. *Baliares*, Slingers' Islands). Group of four large and eleven small islands in the Mediterranean. They are situated off the E. coast of Spain, of which they form a province with area 1,936 sq. m. Apart from Majorca, the largest, Minorca, Ibiza, Formentera, and Cabrera, the rest are rocky islets. They are hilly and belong geologically to the mountain system of Andalusia. The climate is fine, but variable, and the flora and fauna

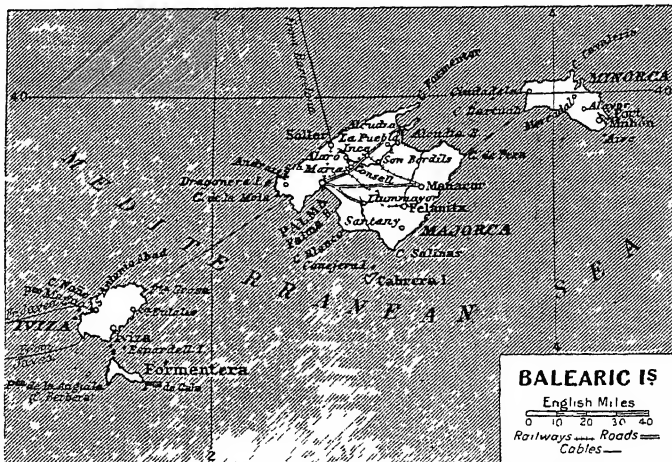
are similar to those of the nearest mainland. The soil is moderately fertile, and minerals abound, as do prehistoric remains.

The inhabitants are Spanish, with a mixture of Moorish blood. In ancient times they had a reputation as slingers in the armies of Carthage and Rome. They are a hard-working manufacturing people. The standard of education is fairly high. Communication with Spain is frequent and regular, especially with Barcelona and Valencia. The chief products are cereals, wine, oil, and fruit, and these, with marble, limestone, and salt, are exported. The local breeds of pigs and mules are highly esteemed. Typical manufactures are silver filigree work and majolica ware. The capital and chief port is Palma; Port Mahón, in Minorca, has an excellent fortified harbour. Pop. of islands, 437,339.

Colonised by the Phoenicians and Carthaginians, the islands were conquered by Romans, 123 B.C., Vandals, A.D. 423, and Moors in 798, becoming a Moorish kingdom in 1009. Port Mahón was captured by the English in 1708, and Minorca was a British possession until 1756, and again 1763–82, being finally ceded to Spain 1803.

During the Spanish Civil War, 1936–39, Palma was a naval base for Gen. Franco's troops, and the Italians constructed aerodromes there. Minorca, which had adhered to the republican govt., surrendered to Franco, Feb. 9, 1939.

Balestier, Charles Wolcott (1861–91). American journalist and author. Born at Rochester, New York, Dec. 13, 1861, he was educated at Cornell and Virginia



Balearic Isles. Possessing a chequered history of over 2,000 years, these Mediterranean islands have been Spanish since 1803

universities. He was part-author, with Rudyard Kipling, his brother-in-law, of *The Naulahka: a Story of West and East*. He died at Dresden, Dec. 6, 1891.

Balfe, MICHAEL WILLIAM (1808-70). Irish music composer. He was born in Dublin, May 15, 1808, and studied under several teachers in Ireland, and later in London and Italy, and in Paris under Giulio Bordogni. He made a name as an operatic baritone in Paris, as Figaro in Rossini's *Il Barbiere*. Composer of an Italian version of *Falstaff*, he is now chiefly remembered by his light opera in English, but of numerous compositions of this class only *The Bohemian Girl*, 1843, keeps its place in the repertory. His most famous song is *I dreamt that I dwelt*, regarded as unlucky by theatrical tradition. He died Oct. 20, 1870. *Consult* Memoir, C. L. Kenney, 1875.



Michael Balfe, Irish music composer

Balfour, EARL OF. U.K. title, held by the family of Balfour since 1922. The first three earls are considered separately. The heir is known as Viscount Traprain.

Balfour, ARTHUR JAMES BALFOUR, 1ST EARL OF (1848-1930). British statesman. Born at Whittingehame, East Lothian, July 25, 1848, he was the nephew of the 3rd marquess of Salisbury and godson of the great duke of Wellington. He was educated at Eton and Trinity College Cambridge, and first entered parliament as Conservative member for Hertford in 1874. As private secretary to Lord Salisbury, then foreign secretary, he accompanied Lord Beaconsfield on his mission to Berlin in 1878. In opposition after the election of 1880 he attached himself for a time to Lord Randolph Churchill's "Fourth Party," though he was the least active member of that group. At the 1885 election Balfour was returned for E. Manchester, a seat he held for the next 21 years.

His first ministerial office came with his appointment as president of the Local Government Board, 1885, but that post was soon changed for the secretaryship of Scotland; then in 1887 he became chief secretary for Ireland, an office that gave him for the first time an opportunity of revealing his full abilities. Political passions

ran high in Ireland at that time, the land war being at its height. But under Balfour the country was ruled with unflinching firmness. He was long spoken of there as "bloody Balfour," but the Irish Nationalists, who began by stoning him, passed through all the stages of surprise, respect, and admiration. Indeed he proved himself to be the strongest minister in the House of Commons, and became its leader on the death of W. H. Smith in 1891. Between 1892 and 1895 he was leader of the opposition, taking a foremost part, with Joseph Chamberlain, in attacking the Gladstone and Rosebery administration.

From the return of the Unionists to power in 1895 until the end of 1905 Balfour was first lord of the Treasury and leader of the House of Commons. When Lord Salisbury retired in July, 1902, he became prime minister. The dominating influence of Chamberlain was then at its height, and Balfour was by no means in complete accord with his powerful lieutenant on the issue of tariff reform, still less on the best way of presenting the issue to the country. The party was therefore split and its majority reduced to impotence. In the general election of 1906, not only were the Unionists routed at the polls, but Balfour himself was unseated at E. Manchester.

Shortly afterwards he became M.P. for the City of London, and retained the seat until raised to the peerage in 1922. The next five years brought strenuous and heated political conflict, Balfour leading the opposition against such Liberal measures as the Licensing Bill of 1907, the Lloyd George budget of 1909, and the Parliament Bill abolishing the peers' veto. His physical strength being overtaxed, Balfour resigned the leadership in Nov., 1911, but continued to give active support to his successor, Bonar Law.

The First Great War opened a new phase of his career. He offered his unofficial services in any capacity, and in the first coalition government formed May, 1915, he became first lord of the Admiralty. In Lloyd George's coalition he was transferred to the foreign office, and in 1917 served the Allied cause

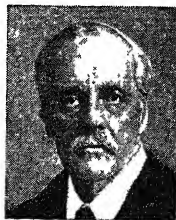
brilliantly as head of the British mission to the U.S.A. American publicists described him at the time as the most successful British envoy ever to visit the U.S.A.

During the Versailles conference of 1919 his position as foreign secretary brought a large share of responsible duties, performed to the admiration of all the Allies. After the signing of the Versailles treaty he left the foreign office, becoming lord president of the council. In 1921-22 he led the British delegation to the Washington naval conference, and on his return was made successively a knight of the Garter and an earl. With the fall of the coalition government in 1922 he retired from active politics and died March 19, 1930.

Balfour, who remained a bachelor, loved music, philosophy, and golf. He wrote *A Defence of Philosophic Doubt*, 1879, *The Foundations of Belief*, 1895, and his Giffard Lectures on Theism and Humanism. His honours included the O.M. and the F.R.S. His personal ascendancy during his long period in the House of Commons was due to an exceptional charm of manner, a staunch loyalty to his friends, and the possession of striking intellectual gifts. On his resignation as leader of his party his great political rival Asquith referred to him as being "by universal consent the most distinguished member of the greatest deliberative assembly of the world." See *Balfour Declaration*; *Education Acts*. *Consult* Lives, Webb and Kenyon, 1931; B. E. C. Dugdale (niece), 1936.

Balfour, GERALD WILLIAM BALFOUR, 2ND EARL OF (1853-1945). British politician. Born April 9, 1853, he was educated at Eton and Trinity College, Cambridge, of which he became a fellow and lecturer. He was Conservative member for Central Leeds from 1885 until 1906. He was chief secretary for Ireland, 1895-1900, president of the Board of Trade 1900-05, and president of the Local Government Board for a few weeks. Defeated at the 1906 election, he retired from politics. On the death of his brother, the above 1st earl, in 1930, he succeeded to the title by special remainder. He married in 1887 Lady Betty Lytton (d. 1942). He died Jan. 14, 1945.

Balfour, ROBERT ARTHUR LYTTON BALFOUR, 3RD EARL OF (b. 1902). British politician. Educated at Eton and Trinity College, Cambridge, he succeeded his father in the earldom in 1945. As Viscount Traprain he was chairman of



Balfour

the Scottish Special Housing Association 1938-44, and in 1942 was appointed regional controller for Scotland for the ministry of Fuel and Power. He was grand master mason of Scotland, 1939-42.

Balfour, LADY FRANCES (1858-1931). British author. Daughter of the 8th duke of Argyll (*q.v.*), she married in 1879 Colonel Eustace Balfour (d. 1911), younger brother of the above 1st earl and prime minister. Taking an active interest in public life, she advocated the enfranchisement of women and their wider educational opportunities. She wrote memoirs of Lady Victoria Campbell, 1911; Dr. Elsie Inglis, 1918; the 4th earl of Aberdeen, 1922; and Lord Balfour of Burleigh, 1925. She died Feb. 25, 1931.

Balfour, FRANCIS MAITLAND (1851-82). British scientist. The third of four brothers, the eldest being Arthur J. Balfour, he was born in Edinburgh, Nov. 10, 1851.

In early boyhood he showed an interest in science, which he continued at Harrow and at Trinity College, Cambridge, where he began to specialise in animal morphology. After taking his degree he continued his studies at Naples. He was elected fellow of Trinity and university lecturer in animal morphology, and in 1880-81 published his work on Comparative Embryology. A special professorship had just been created for him, when he was accidentally killed on the Alps, July 18 or 19, 1882.

Balfour, SIR ISAAC BAYLEY (1853-1922). British botanist. Born at Edinburgh, March 31, 1853, son of Prof. John Hutton Balfour, he was professor of botany at Glasgow 1879-84, and Sherardian professor of botany at Oxford 1884-88, and became professor of botany at Edinburgh in 1888. He wrote on the flora of Rodriguez, and died Nov. 30, 1922.

Balfour, JABEZ SPENCER (1849-1916). British company promoter. Educated abroad, he became the principal promoter of the Liberator Building Society, 1868, and an allied group of similarly speculative concerns, including the Lands Allotment Company and the House and Land Investment Trust. All these concerns failed in 1892, with total liabilities of £8,360,000, in-

volving in ruin a large host of small investors. Balfour, who was Liberal M.P. for Tamworth, 1880-85, and Burnley, 1889-93, and first mayor of Croydon, 1883, fled to Buenos Aires in 1893, but was arrested. Sentenced at the Old Bailey in 1895 to 14 years' penal servitude for fraud and conspiracy, and released in 1906, he died Feb. 23, 1916. *See Liberator Frauds.*

Balfour, SIR JAMES (d. c.1584). Scottish judge. For complicity in the plot to murder Cardinal Beaton (*q.v.*) he served a sentence in the French galleys from 1547-49, gaining his freedom by abjuring his creed. He is supposed to have drawn up the bond for Darnley's murder. Made governor of Edinburgh Castle by Bothwell during Murray's regency, he was president of the court of session, and was probably part-author of the earliest text-book on Scottish law, known as Balfour's Practicks. Balfour was "the most corrupt man of his age," who, according to P. F. Tytler, "had served with all parties, had deserted all, yet had profited by all."

Balfour OF BURLEIGH, BARON. Scottish title, created 1607. The 3rd and 6th barons are noticed separately below. The 7th baron, George John Gordon Bruce, was born Oct. 18, 1883, and succeeded his father in 1921. In 1945 he was chosen to succeed Lord Wardington as chairman of Lloyds Bank.

Balfour OF BURLEIGH, JOHN BALFOUR, 3RD BARON (d. 1688). Scottish nobleman, only son of Robert, second baron, whom he succeeded in 1663. He is sometimes confused with the covenanter, John Balfour of Kinloch, one of the principals in the assassination of Archbishop Sharp in 1679, and the "John Balfour Burley" of Scott's Old Mortality. The third Lord Balfour of Burleigh was not a covenanter.

Balfour OF BURLEIGH, ALEXANDER HUGH BRUCE, 6TH BARON (1849-1921). British politician. Born at Kennet, Alloa, Jan. 13, 1849,



Jabez Balfour, company promoter

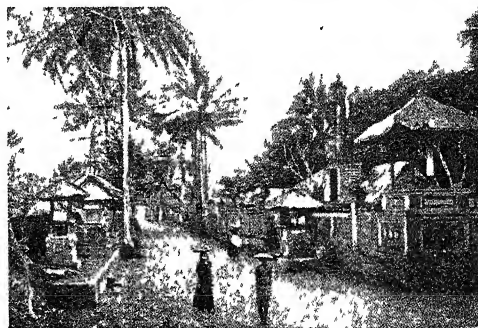
the son of a commoner, in 1869 he was given the title of Balfour of Burleigh, forfeited by one of his maternal ancestors in 1716. Educated at Eton and Oriel College, Oxford, he entered public life in 1874. As a Conservative he was parliamentary secretary to the Board of Trade, 1889-92, and from 1895 to 1903 secretary for Scotland, a post he resigned owing to his hostility to Chamberlain's tariff reform proposals. In 1916 he was chairman of the Committee on Commercial and Industrial policy. He was the author of Rise and Development of Presbyterianism in Scotland, 1911. He died July 6, 1921.

Balfour OF INCHRYE, HAROLD HARTINGTON BALFOUR, 1ST BARON (b. 1897). British politician. Born Nov. 1, 1897, and educated at the Royal Naval College, Osborne, he joined the 60th Rifles in 1914, transferred to the R.F.C. in 1915, and served with the R.A.F. until 1923. In 1929 he became Conservative M.P. for the Isle of Thanet and was still holding the seat when created a baron at the dissolution of 1945. He was under-secretary for Air 1938-44, and minister resident in W. Africa, 1944-45.

Balfour Declaration. Letter dated Nov. 2, 1917, from A. J. Balfour, then British foreign secretary, to Lord Rothschild, chairman of the British Zionist Federation. Promising to seek the establishment of a Jewish national home in Palestine, this document became the keystone of Zionist politics. *See Zionism.*

Balham. Residential suburb of S. London. It is one of the E. wards, and, with Tooting, a parl. constituency returning one member, of the borough of Wandsworth. An offshoot of the parish of Streatham, it is fringed by Tooting Common. Pop. 53,982. *See London.*

Bali. Island of Indonesia. It lies E. of Java, from which island it is separated by a narrow,



Bali. Native life in the Dutch E. Indies. Street of Singaradia, in the Island of Bali, with a Hindu temple

shallow strait. The channel between Bali and Lombok (*q.v.*) is known as Wallace's line. Bali is mountainous in the centre, the volcano Gunung-agung attaining 10,497 ft., and has an area of 2,160 sq. m. In climate, flora, and fauna it resembles Java. Akin to the Malayan-Javanese, the natives are clever workers in sculpture and metal work. The chief products are rice, cotton, coffee, sugar, and tobacco. Buleleng is the capital. Bali was not brought under Dutch suzerainty until the late 19th century. Pop., with Lombok, 1,802,683.

The Japanese landed in Bali, Feb. 20-22, 1942, and remained in occupation until Dutch troops arrived March 2, 1946. A period of guerrilla war and terrorism by Balinese against the Dutch followed, ending June, 1948, with the surrender of 750 young rebels. Bali was made one of the 13 dists. of the federal state of E. Indonesia, Dec., 1946. See Indonesia.

Balieff, NIKITA (1877-1936). Russian impresario. He began his career at the Moscow Arts Theatre, subsequently evolving La Chauve-Souris (The Bat), a carabet entertainment which was to make his name famous throughout W. Europe and the U.S.A. Balieff left Russia during the revolution of 1917, and organized a troupe of dancers, singers, and actors into a highly drilled company. La Chauve-Souris consisted of songs and sketches, timed and ordered with the utmost precision. He died in New York, Sept. 3, 1936.

Balikesir OR **BALIKISIRI**. Town of Asiatic Turkey. Famous for its great annual fair in Aug., it lies 75 m. S.W. of Bursa, on the rly. from Panderma to Soma. Standing in a plain of remarkable fertility, it produces grain and fruit. Pop. of town, 25,740. It gives its name to a vilayet with pop. 526,265.

Balik-Papan. Seaport on the S.E. coast of Dutch Borneo. Some 15 million barrels—one fifth of the oil from Indonesia—were produced annually in or near Balik-Papan. When the Japanese invaded Borneo in 1942 the Dutch fired the wells on Jan. 22. The Japanese occupied Balik-Papan, Jan. 27, and got the wells into production again. During June, 1945, the area was heavily bombed by U.S. and Australian aircraft. The Australian 7th div. landed here July 1, and secured the town by July 4.

Balilla. Name of the young boys' state organization set up by the Italian fascist government in

April, 1926, to embody all boys' organizations. Its ostensible purpose was the physical and moral training of the young, and athletic drill in the schools by specially trained teachers. Its real aim, however, was to take in hand the younger generation at an early age and prepare it for the pre-military stage which was reached at 14. The Balilla also had branches in all foreign countries, wherever Italian communities lived. It was named from the Genoese youth Balilla, who in 1746, by throwing a stone at an Austrian soldier, started a popular revolt against the Austrians then occupying Genoa.

Baliol, EDWARD (d. 1367). King of Scotland. The eldest son of John Baliol (d. 1315), whose French estates he inherited. He invaded Scotland in 1332, and was crowned king at Scone, and did homage to Edward III of England. A pawn in Edward's hands, in 1356 he finally surrendered the whole of Scotland to the English king in return for a pension. He died without issue at Wheatley, near Doncaster.

Baliol, JOHN (1249-1315). King of Scotland. He was the third son of John Baliol (d. 1269), founder with his wife of Balliol College, Oxford. On the death in 1290 of Margaret, the Maid of Norway, he claimed the Scottish crown through his maternal grandmother, Margaret, eldest daughter of David, earl of Huntingdon, grandson of David I. He was recognized as king by Edward I of England, crowned at Scone, Nov. 30, 1292, and did homage to Edward. In 1295 he made an offensive alliance with France, and in 1296, when Edward made war on France, the Scots invaded England. Edward promptly returned, defeated the Scots, and Baliol surrendered the crown in July, 1296. He was imprisoned in the Tower until 1299, and then released, retiring to his French estates. He died in Normandy. The name Baliol comes from Bailleul in Normandy.

Bali Straits, BATTLE OF. Naval operation of the Second Great War. On Feb. 19, 1942, a large Japanese force landed on the island of Bali, wiped out the small Dutch military garrison there, and captured the aerodrome at Den Pasar. This success provided the

enemy with a base from which to furnish air cover for the ferrying of large forces across the narrow Bali Strait to Java (*q.v.*). Some days before the capture of Bali, Dutch reconnaissance aircraft had reported large concentrations of Japanese transports and warships in the Macassar Strait and in the South China Sea, obviously intended for the invasion of Java. Although the covering force of Japanese cruisers was known to be at least three times as great as that available to the Allies, Vice-Admiral Helfrich, who had been appointed C-in-C. Allied naval forces, S.W. Pacific, ordered Rear-Admiral Doorman to attack the enemy with his forces in the Indian Ocean. Doorman's fleet consisted of two Dutch cruisers and one Dutch and two American destroyers; a second force consisting of the Dutch cruiser Tromp and four small American destroyers was ordered to sail from Surabaya for Bali.

The Dutch plan was for Doorman's force to proceed at full speed to Lombok Strait and engage the Japanese first, and for the second Allied force to attack a few hours later when the enemy would, it was thought, be in confusion. The operation depended wholly on surprise. It was probable the enemy had already closed in on the Strait of Bali. Before the attacking warships could open fire on the enemy's invasion craft, it would be necessary to light up the entire bay with star shells, so giving warning of the Allied ships' approach. By the time Doorman's warships reached Bali, the Japanese had captured the island, but it was decided to attack the enemy ships before midnight of Feb. 19, 1942, when the invaders would be busy with landing operations.

At 9 p.m. the operation began. First, in line ahead, came the Dutch cruisers De Ruyter and Java, followed by the Dutch destroyer Piet Hein. The two U.S. destroyers, under Commander Binford, brought up the rear. The De Ruyter opened fire first, her star shells lighting up a number of Japanese ships at close quarters. The Java hit and set on fire a large transport, but by that time the Japanese had recovered from their surprise, and their warships opened up on the Allied vessels. The Java was hit in the stern by an 8-in. shell, though no vital damage was done, and the De Ruyter was slightly damaged. The Piet Hein released her torpedoes and hit a Japanese cruiser, but



John Baliol,
King of Scotland

shortly afterwards she was herself hit in the boiler-room, and while helpless was torpedoed and sunk.

The two American destroyers steamed into the middle of a formation of Japanese transports and destroyers and loosed off their torpedoes, doing considerable damage. Although the Allied attack lasted only ten minutes, the enemy had been thrown into complete confusion and had lost a number of transports and possibly some warships. But by the time Doorman's force had broken through the enemy, the admiral realized that the Japanese were too strong in heavy cruisers for him to turn and engage them once more. Accordingly, he returned to Surabaya. Shortly after midnight the Tromp and the four American destroyers appeared on the scene and opened fire on the Japanese ships, some of which were lit by arc lights to enable their crews to repair the damage sustained in the earlier raid. The Dutch cruiser opened fire at short range and immediately registered hits on a large vessel to port. Then the Tromp herself nearly met disaster. In the darkness she had passed an enemy warship unawares against the dark background of the island. The Japanese vessel had sighted the Dutchman, and, turning, opened fire from a few thousand yards on the Tromp's starboard beam. The Tromp's fire-control system was destroyed by an 8-in. shell, but her 6-in. gun turrets fired independently at the searchlights which the Japanese warship had switched on to light up the Tromp. Within a few minutes the enemy vessel's fire

ceased. The Tromp, however, had received nearly a dozen direct hits from 8-in. shells and many of her crew were dead. Accordingly, her captain decided to withdraw.

In the meantime, the U.S. destroyers had each launched their dozen torpedoes, hitting a cruiser, several destroyers, and a number of transports. The American attack took the enemy completely by surprise, throwing them into confusion, with wild shooting in all directions. One of the American destroyers was holed in the stern, but was able to follow the Tromp out of the battle. Two others, which had been cut off by the Japanese, turned and steamed away southwards.

The success of the action denied to the enemy the use of Bali for the attack on Java by land forces, though the Japanese ultimately invaded the archipelago by two other routes.

David Le Roi

Balk. Town of Afghanistan. Anciently known as Bactra, and reputed to be the birthplace and burial place of Zoroaster, it is still described as the mother of cities. In the 3rd century B.C. Bactra, capital of the ancient Bactria, rivalled Nineveh and Babylon, and was the capital of a powerful Greco-Bactrian monarchy. It was destroyed by Jenghiz Khan A.D. 1220, and superseded by Mazar-i-Sharif as capital of the prov. 1877.

Balkan Air Force. Composite group of the Mediterranean Allied air forces formed Aug. 5, 1944, under the command of Air Vice-Marshal W. Elliot. The Balkan Air Force centralised the conduct of air operations in the Balkans,

except strategic bombing, and intensified the air attacks on the enemy forces engaged by Yugoslav partisans. Bombing the escape routes of Axis troops withdrawing from Tirana, Nov. 11, 1944, was a typical operation.

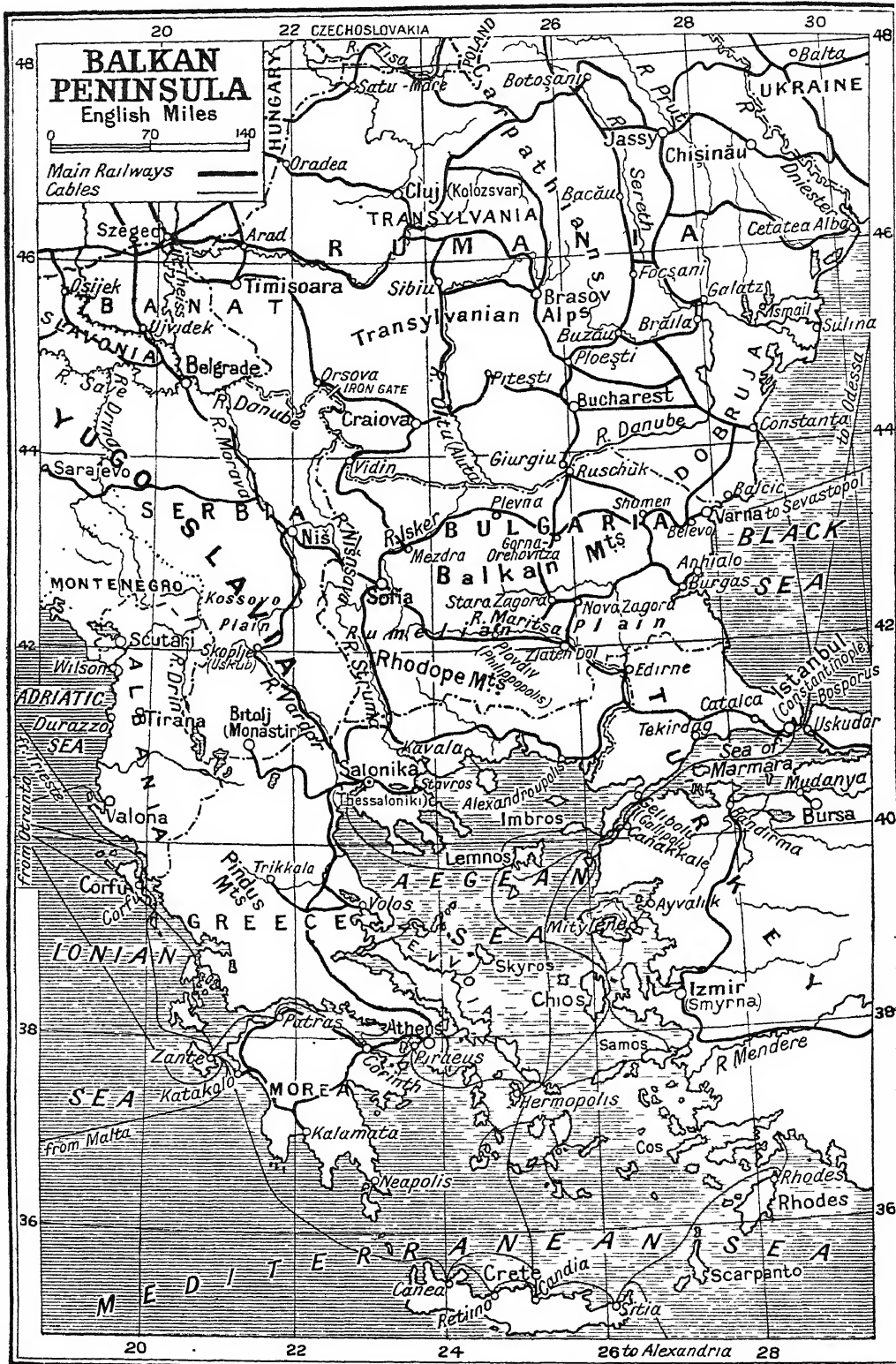
Balkan Entente. Regional pact between Greece, Turkey, Yugoslavia, and Rumania, concluded on Feb. 9, 1934, whereby the signatories mutually guaranteed their Balkan frontiers and pledged themselves to abstain from independent action with any non-signatory Balkan state. A secret protocol provided for joint action if a signatory were attacked by a non-Balkan power and a Balkan state joined in the aggression. A second secret protocol specified the measures to be taken against Bulgaria if she intervened. At a conference in Belgrade, Feb., 1940, the Balkan Entente was renewed for a further period of 7 years and the desire for a policy of neutrality in the Second Great War was emphasised. The political developments arising out of that war made the entente a dead letter.

Balkan Mountains (anciently Haemus). Mt. range of S.E. Europe. Traversing Bulgaria from W. to E., with the Stara Planina on the Serbian boundary, it extends from the Iron Gates of the Danube to Cape Eminch on the Black Sea. These mts. form a portion of the great east-west mt. system of Eurasia, of which the Alps and Himalayas are the best known members. Southwards the Balkans present a steep face, but to the N. fall more gently, opening out into a plateau sloping to the Danube. Among the loftiest peaks are Yumrukchal, 7,786 ft.; Kadimlia, 7,478 ft.; and Ambarika, 7,317 ft. The eastern ridges are lower and more broken, with an average alt. of 3,000 ft. Geologically the Balkans are composed chiefly of sedimentary strata, consisting of limestone with a core of crystalline schists and granites containing iron, copper, and lead. Troyan, Rosalita, and Shipka are the best known passes. See Rhodope Mts.

Balkan Peninsula. Easternmost of the great peninsulas of southern Europe, also called the Illyrian Peninsula. It is bounded N. by the rivers Danube and Save, S. and S.E. by the Black Sea, the Sea of Marmara, and the Aegean, and W. by the Adriatic and the Ionian Sea. It consists of Bulgaria and Turkey in Europe on the E., parts of Yugoslavia, and Albania and Greece, the total



Balkan Mountains. The monastery of Rilo, looking towards the Djúmaia pass, amid the magnificent mountain scenery of Bulgaria



Balkan Peninsula. Map showing the Balkan States, with boundaries as they were at the beginning of 1939

area being in the region of 180,000 square miles.

The S. part of the peninsula is the Morea, the S. portion of Greece, virtually an island. Most of the peninsula is mountainous. The central range of the Balkans proper, which gives it its name, runs through Bulgaria from W. to E.; below this range are the southern Balkans and the Rhodope Mts., the latter rising to about 10,000 ft. In the centre are various mt. chains, and on the W. the Dinaric Alps, the Albanian Mts., and the Pindus Mts., Mt. Dinara being over 6,000 ft. Except the plain of Rumelia in Bulgaria, and the much smaller Kossovo Plain, in Serbia, the plains are of small extent.

The mountainous character of the peninsula makes the rivers short and rapid, and thus mostly unfit for navigation. The Danube, which receives the Morava, Isker, and other streams, flows to the Black Sea; the Maritza, Struma, and Vardar are the largest of the rivers falling into the Aegean Sea; and the Narenta, Viosa or Voyusa, and Drin are the most considerable streams emptying into the Adriatic. The principal lakes are Scutari, Ochrida, and Prespa.

The Morava-Vardar valleys form the main route from Belgrade to Salonica both by rail and road; the upper part of this route as far as the Nishava is that of the Orient Express, which goes up the Nishava to Sofia and Istanbul. In Bulgaria rlys from Sofia and from Varna connect with the Rumanian systems; from Salonica lines run E. to Istanbul and W. to Bitolj (Monastir), the Greek railways serve N.E. Greece S. to Athens, from which a line runs on to Corinth and round the Morea. The peninsula experiences a great variation of climate. In the central portion and on the E. coast it ranges between that of Central Europe and S. Russia. On the Aegean coast the winters are quite mild. Rainfall is fairly uniform throughout the year in the central portion and on the E. coast, scanty on the Aegean coast, and copious on the W. coast. The products are wheat, maize, cotton, tobacco, plums, grapes, olives, and mulberries, and cattle, sheep, pigs, and goats. When Constantinople was taken in 1453 by the Turks, they swept across the land, but in the 16th century they began to be pushed back, and, before the First Great War, mainly as a result of the Balkan Wars, had lost all the small portion E. of the Maritza, and S. of lat. 42° N. See Bulgaria; Greece; Rumania, etc.

THE BALKAN WARS OF 1912 AND 1913

Robert Machray, Writer on Foreign Affairs

Below are described the war carried on by the Balkan States against Turkey in 1912-13 and the succeeding war against Bulgaria. See also under Adrianople; Kirk Kilisse. Salonica, etc.

During the summer of 1912 Bulgaria, Serbia, Greece, and Montenegro formed themselves into the Balkan League with the object of liberating Macedonia from the Turkish yoke. In this region, largely inhabited by Bulgars, Serbs, and Greeks, the Turkish Government had promised to institute reforms, but had never carried them out, in spite of pressure from the Great Powers. The general programme of the league contemplated the ultimate ejection of the Turks from Europe, and this might have been achieved in the first war had the Bulgars shown bolder generalship. Each member of the league also had some individual purpose, e.g. Serbia was bent on obtaining access through Albania to the Adriatic, while the others desired territorial gains of one kind or another.

First Bulgaria and Serbia entered into a military convention against Turkey, with the practical adhesion of Montenegro, which was in close sympathy with Serbia. Greece joined them later, and before war began Turkey made strenuous but vain attempts to induce her to break away. The massacre of a number of Bulgars at Kotchana in N.E. Macedonia by the Turks early in Aug. led to a formal protest to Turkey, who, however, disregarded it. The league was actively working for war, and mobilisation took place in Sept. in Bulgaria, Serbia, and Montenegro, Greece following suit in the first week of Oct., when Turkey also began mobilising; but she was badly prepared for such a course, as a few weeks before she had disbanded an army of 120,000 men concentrated at Smyrna to repel an Italian invasion.

Outbreak of Hostilities

By diplomacy and threats the Great Powers vainly endeavoured to prevent the outbreak of hostilities. On Oct. 8 Montenegro declared war on Turkey, and her troops, with whom were the Mirdite and Malissori Albanians, advanced on Scutari. Greece proclaimed her full sovereignty over Crete, and the league sent a note to Turkey demanding the immediate establishment of autonomous provinces in Macedonia, with Christians as governors. Turkey replied by withdrawing her diplomats from the Balkan states, and, having made peace with Italy, declared war on Oct. 17. On

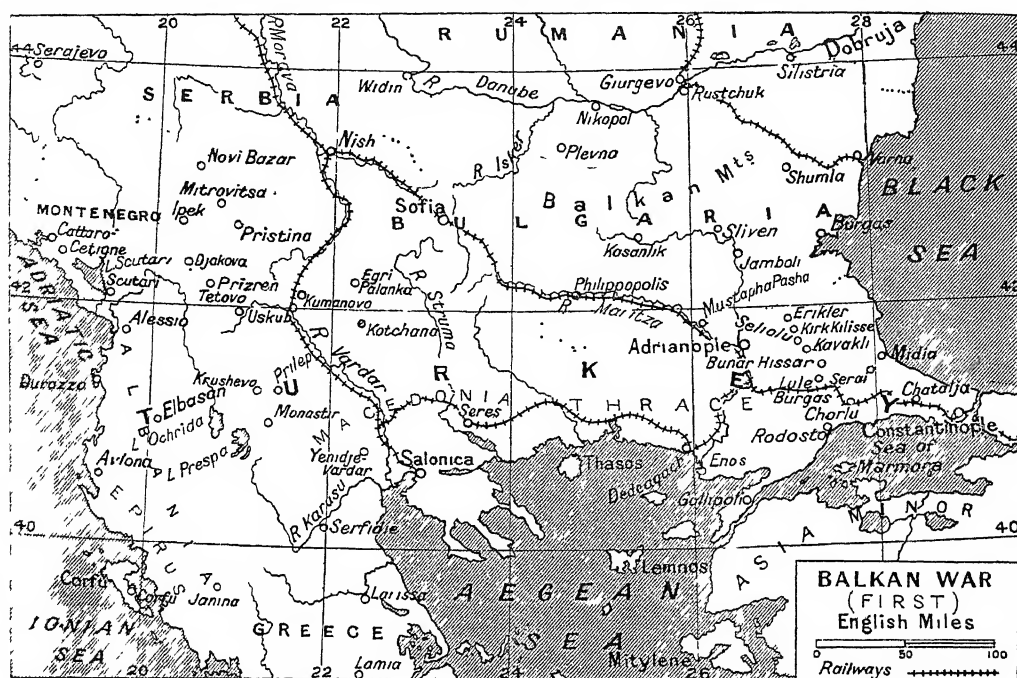
the following day Bulgars, Serbs, and Greeks invaded Turkish territory at various points—the Bulgars entering Thrace from the N., and the Serbs and the Greeks entering Macedonia from the N. and S. respectively.

The two main theatres of war were Thrace and Macedonia; there was some fighting in the Novi Bazar district, in Epirus, and in Albania, but here the contest was of secondary importance. In round numbers Bulgaria put into the field upwards of 300,000 men, Serbia 190,000, Greece 110,000, and Montenegro 35,000. Turkey had considerable forces in Asia Minor, but these were not available at the beginning, while the Greek fleet controlled the Aegean and barred the Turks from dispatching troops by water to Macedonia. When war broke out, Turkey had about 190,000 men in Thrace, and nearly 200,000 in Macedonia and Albania, under the chief command of Nazim Pasha; the Balkan allies thus had a preponderance of almost two to one.

Turkish Calculations Upset

The general plan of the Turks was to stand on the defensive. They believed that the main theatre of the war would be Macedonia, not Thrace, and made preparations accordingly; but the discovery that an active offensive in Thrace was part of the plan of the league upset their calculations. Under the military convention between Bulgaria and Serbia, one-third of the Bulgarian army was to cooperate with that of Serbia in Macedonia. Notwithstanding this arrangement, however, except one division which worked through E. Macedonia towards Salonica, the whole Bulgar army concentrated on Thrace in three armies, with General Savoff in chief command, General Ticheff being chief of staff.

The second army, under General Ivanoff, about 90,000 strong, advanced on Adrianople and occupied Mustapha Pasha on Oct. 18. It invested Adrianople on the W., N.W., and N. four days later. The third army, under General Dimitrieff, 80,000 strong, marched from Jamboli towards Kirk Kilisse, while the first army, under General Kutincheff, 80,000 strong, advancing between the two other armies, defeated a Turkish force at Selolu and pursued it to Kavakli.



Balkan War of 1912. Territorial position in the peninsula when the Balkan states of Greece, Bulgaria, Serbia, and Montenegro combined to emancipate Macedonia and Thrace from Turkish tyranny

The Turks, under Abdullah Pasha, had about 130,000 men in the field, with 60,000 men in garrison at Adrianople under Shukri Pasha, and Abdullah, on the line Adrianople-Erikler, undertook an offensive, but it failed under Bulgarian attacks on Oct. 22. Dimitrieff drove on to Kirk Kilsse, an important junction of roads defended by two forts, on Oct. 23-24 defeated three Turkish corps under Mahmud Mukhtar Pasha, and entered the town on Oct. 24. He wished to push on, but Savoff overruled him, and the Bulgars halted for four days, which allowed Abdullah to make good his retreat to the Karagatch-dere, and to reorganize his troops. On Oct. 28 the Bulgars were driven back to the heights of Karagatch, and furious fighting developed on the front Bunar Hissar-Lule Burgas, lasting until the night of Oct. 31 around Lule Burgas, which was taken by the Bulgars on that day, and around Bunar Hissar until Nov. 2, the Turks, whose losses had been severe, falling back unpursued through Chorlu and Serai on the Chatalja lines. Had Dimitrieff pressed on after his victory at Lule Burgas he probably would have been able to march on to Constantinople, but in obedience to instructions from Savoff he halted, and this gave the Turks time

to fortify themselves at Chatalja, which he did not reach until Nov. 12. His attempt to storm the Chatalja lines on Nov. 17-18 failed.

Meanwhile the Serbians and Greeks had been successful in Macedonia, and the Montenegrins, though they were held up in front of Scutari, had taken Ipek and Djakova. In the Novi Bazar district the Serbians captured the town of Novi Bazar on Oct. 21, took Mitrovitsa two days afterwards, and by Oct. 29 had the whole of the sanjak in their hands.

Serbian Successes

A second Serbian group stormed Pristina on Oct. 22. But the main contest was between the first army of the Serbians, under the crown prince Alexander and General Bojevitch, about 90,000 strong, aided on the E. by the second army, of about 25,000 men, near Egri Palanka, and the Turkish army of the Vardar, under Zekki Pasha, consisting of 85,000 troops, supported by 20,000 Albanians.

In the battle of Kumanovo the Turks were decisively defeated on Oct. 23-24, the Serbs occupying Uskub without opposition on Oct. 26. The Turks fell back on Prilep and Tetovo (Kalkandelen), followed slowly by the Serbs. In Nov. the second Serbian army, under General Stepanovitch, was transferred to Adrianople to assist the

Bulgars besieging it, and in the beginning of that month the first army advanced southward on Monastir, after taking Tetovo on Nov. 1. It captured Prilep on Nov. 5, and Krushevo on the following day.

After a great battle on Nov. 16-18, Monastir passed to the Serbians on Nov. 18, and the Turks had lost the campaign in that part of Macedonia. Nor were they more fortunate in the southern section, where they were attacked by the Greek army, with the crown prince Constantine as commander-in-chief, General Danglis being chief of staff. This army, except one division which was in Epirus watching Janina, comprised all the Greek forces. Moving towards Salonica, it defeated the Turks, under Hassan Tahsin, at Serfidie (Sarantoporon) on Oct. 22, and again at Yenidje-Vardar on Nov. 1-2. Forcing the Vardar, the Greeks obliged Salonica to surrender on Nov. 9.

During Nov. the Serbs, after a magnificent march through the mountains of Albania, reached the Adriatic at Alessio and Durazzo, and held all N. Albania by the beginning of Dec. This excited the jealousy of Austria, and led to the establishment of the independence of Albania by the Great Powers, who later put pressure on Serbia to withdraw from Albania, which, however, she did not do until the

autumn of 1913, under threats from Austria. On Dec. 3 an armistice was arranged between Bulgaria and Serbia on the one hand and Turkey on the other, but Greece continued the struggle into Feb., 1913, when the general conflict was renewed.

A conference in the meantime had met in Dec. in London, which was attended by representatives of the Balkan states and Turkey, but no settlement was reached, though the independence of Albania was provisionally proclaimed. The features of the second phase of the first war were the successful resistance of the Turks at Chatalja, their loss of Janina to the Greeks on March 6, and of Adrianople to the Bulgars and Serbs on March 25-26. Turkey admitted defeat, and a second armistice was signed at the end of March, except by Montenegro, who continued the siege of Scutari, which fell to her on April 22, but which the Great Powers compelled her to evacuate on May 6. The first Balkan War was ended on May 30 by the treaty of London, whereby Turkey ceded to the Balkan League her European territory west of a line drawn from Midia, on the Black Sea, to Enos, on the Aegean, as well as Crete.

Second Balkan War

The second Balkan War was fought in 1913 between the Bulgarians on the one side and the Serbians and Greeks on the other. The treaty of London, which ended the first Balkan War, had scarcely been signed when the Balkan League went to pieces, its members disagreeing as to the division of the ceded territory. In May, 1913, Serbia and Greece signed a military convention for common action, and on June 29-30 the second Balkan War broke out, Bulgaria starting it by a sudden treacherous attack.

Dimitrieff commanded the Bulgars, General Putnik the Serbs, and Constantine, who in March had succeeded to the throne, the Greeks. The Bulgars, with Ivanoff in local command, attacked the Greeks in the Drama-Seres region and drove them back, but themselves were held up by July 1, and, defeated at Gevgheli and Kilkis, evacuated Kavalla. But the main Bulgar attack was directed by Dimitrieff against the Serbs about Krivolak, which they lost, and on the general line of the Bregalnitz, where the struggle was most severe. At first the Bulgars gained ground, but by July 9 were decisively beaten in the battle of the Bregalnitz. An assault made on the Serbs farther N. also failed.



Balkan Wars. The extent of territory lost by Turkey as a result of the fighting during 1912-13

On July 10 Rumania intervened to impose peace and exact part of the Dobruja from Bulgaria. Her troops advanced into Bulgaria unopposed; Turkey saw her opportunity and reoccupied Adrianople without resistance. The Serbs took Egri Palanka on July 14, and pressed the Bulgars back. On July 25-27 the Greeks defeated the Bulgars at Semitli, and by July 30 Bulgaria was surrounded and her position hopeless. Next day she was granted an armistice. Peace was made on Aug. 10 by the treaty of Bukarest between Bulgaria on the one side and Rumania, Serbia, Greece, and Montenegro on the other. Later Bulgaria and Turkey signed a treaty of peace.

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Balkaria-Kabardin. Autonomous republic of the R.S.F.S.R. In the N. Caucasus, it is bordered on the S. by Georgia S.S.R. Nalchik is the chief town.

Balkhash. Saltlake of Kazakh S.S.R., also called Tengis. After being a large body of water, and then decreasing much in area, it began to rise, with every appearance of approaching its old limits. Situated about 120 m. from the Chinese

frontier, it is 330 m. long and at its widest 53 m. broad. With an area of some 8,500 sq. m., it is fed by the Ili and other streams, but has no outlet. It lies about 800 ft. above sea level. Kounrad, on the N., is the principal town; here are copper beds, while in the vicinity occur zinc and molybdenum. Kounrad is on the air line from Alma-Ata to Akmoinsk. See Pribalkhash.

Ball. A spherical or globular body, either natural or artificial. The word in this first sense is derived from the Icelandic *bolli*, meaning a globe. In its second sense, that of a large social dance, it comes—through the French *bal*—from late Latin *ballare*, to dance; Gr. *ballizein*, to throw the leg about. The different ball games are described under the various headings, e.g. Croquet; Football.

Ball, JOHN (d. 1381). English priest and social rebel. First heard of at York, and later at Colchester, he was for 20 years an itinerant priest, preaching and organizing the social insurrection which took place under Wat Tyler, 1381. His doctrine was revolutionary, and remarkable for its advocacy of social equality, at that time a novel theory. Ball's sermon to the peasants at Blackheath is given in Froissart, and his activities were conspicuous throughout the insurrection. He was excommunicated for his social "errors, schisms, and scandals against the bishops and

clergy" by three successive archbishops of Canterbury, and was in prison at Maidstone when the rising began. Released by the rebels, he was taken at Coventry on the suppression of the rising and hanged at St. Albans, July 15, 1381.

Besides writing many letters and rhymes urging revolt, he adopted for his text the couplet: When Adam dived and Eve span, Who was then the gentleman? The Dream of John Ball, by William Morris, is an appreciation in romance. *Consult* Leaders of the People, J. Clayton, 1910.

Ball, Sir Robert Stawell (1840-1913). Irish mathematician and astronomer. Born at Dublin, July 1, 1840, the son of the naturalist Robert Ball (1802-57), he was educated at Trinity College, Dublin, and in 1874 became royal astronomer of Ireland. In 1892 he was appointed Lowndean professor of astronomy and geometry at Cambridge university.

Ball's *Treatise on the Theory of Screws*, 1900, is a lasting contribution to mathematical science. He was known as a lucid and popular writer and lecturer on astronomy. He was knighted in 1886, and died Nov. 25, 1913. *Consult* Reminiscences and Letters, edited by his son, W. Valentine Ball, 1915.

Ballad. Form of poetry, usually narrative. The term derives from the Italian *ballare*, to dance, and in Italy was originally equivalent to the ancient *carole* or dance-lyric of France. The English term was, so far as is known, first applied, as it still is, to a species of lyric-epic preserved in Great Britain, and, under different designations, in other countries, mainly in tradition. In English the word is also applied, in a wider sense, to satirical and other abusive rhymes; also to short narrative verse.

The original ballad of tradition is, however, after a fashion epic as well as lyrical. It was at first probably sung to the accompaniment of the dance—as, indeed, it still is in the Faroe Isles—the chorus adding to the effect by the repetition of a refrain. The ballad is a narrative song or recital, but is distinguished from purely epic verse by its conciseness, its limitation to a single episode, and its impersonal and

elementally dramatic character. Its main appeal is to the stronger or more serious passions or emotions; its story is usually intensely, and sometimes painfully, tragical, and its function is the production of an impressive dramatic climax, to aid in which it often uses the device of incremental repetition. It seeks to concentrate the attention on the thing done or suffered rather than on the doer or sufferer. It is the exact antithesis of didactic poetry. In its older form it is destitute of moral intent, even apart from the fact that it has closer relations with paganism than with Christianity.

Medieval Origin

In many instances we do not even possess any traditional pure form of the ballad. Still, even when little is left of the original text of a ballad, the story in its general form, and frequently also the refrain, remain. Comparatively excellent examples of the ballad have been preserved in fairly early MSS. Prof. Child tells us that the incidents of many ballads are such as might occur anywhere and at any time, that tales and songs were the chief amusement of all classes of people during the Middle Ages, and that the Crusades brought the chief European nations into close intercourse with each other and made them acquainted with the East. There is thus no *a priori* reason for confounding the ballad with the ancient tale, or for having recourse to such vague, assumptive phrases as the "folk fancy." Child moreover concludes that "the traditional form of the ballad is always a more or less deteriorated form," and laments that "so few ballads have been written down early." Gaston Paris adduces evidence for assigning their origin to poets of the later Middle Ages, who have given an original colour to themes found in popular tradition, in earlier poetry, in old romances, in actual events, and in surviving pagan beliefs and superstitions. This species of poetry is in form and style a kind of blend of the epic *chanson* and the lyrical *carole*. Some would find its cradle in France, others in Scandinavia.

Tragedies consequent on incest, adultery, love, jealousy, and bride-stealing are the most common themes of the older ballads. A piquant form of the love tragedy is produced by employment of the wiles of wicked spirits, dwarf kings, and fairies; or a weird element is introduced by appeal to old beliefs in magic, necromancy, the

return of the dead, and other impressive superstitions. A species of ballad common in Denmark and Spain is a derivative of the *chanson de geste*, and in Britain a similar variety is represented in the Robin Hood ballads and the later ballads of the Borders. In Scandinavia many themes are derived from the old sagas, and a few deal with historical incidents of the 13th century. With the exception of The Gude Wallace, derived from Blind Harry's poem, the theme of no British historical ballad is of earlier date than the 14th century; and in Spain, France, Italy, and Provence the historic themes are not of earlier date than the 16th.

The short, intensely dramatic ballad with the refrain and incremental repetition is the older form of the ballad. An excellent English example is Robin and Gandelyn, preserved in a MS. of 1450. As for the best existing versions of Scottish ballads, some are of doubtful authenticity. Of the sources of the remarkable versions of Earl Brand, Sir Patrick Spens, and other ballads sent by Lord Hailes to Bishop Percy, and published by him in his *Reliques*, 1765, or of Edom o' Gordon, printed from a copy furnished by Lord Hailes in 1755, there is no explicit information. The best ballads in Scott's *Border Minstrelsy* owe much of their magic charm to the genius of Scott himself. *See* Poetry.

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Ballade. Verse form of French origin. Developed probably by Guillaume de Machault (1295-1377) from the native dance songs of his country, and perfected by François Villon, Eustache Deschamps, and Charles d'Orléans, the ballade was introduced into England in the 14th and 15th centuries, and revived with success in the 19th century, notably by Andrew Lang and Austin Dobson. ☐

The ballade consists of three stanzas, usually of eight lines with



Sir Robert Ball,
Irish astronomer
Russell

identical rhyme arrangement, ababbcb, and a fourth stanza, called the envoy, of four lines rhymed bcbc, the last line of all four stanzas being the same. The three stanzas should contain varied presentations of the motive thought of the poem; the envoy sums up its permanent element. Written usually in pentameter or tetrameter lines, the ballade lends itself to lighter themes than the sonnet, and is an excellent medium for expressing delicate fancy.

Ballade. In music, an instrumental piece, with a literary background either declared or left to the hearer's imagination. Examples are the ballades of Chopin for the pianoforte.

Ballad Opera. English stage entertainment of the 18th century. First introduced in 1728 with *The Beggar's Opera* (*q.v.*), it became a leading fashion in theatrical entertainment during the ensuing decade, to the great detriment of the Italian opera which had previously held the field. Over 70 ballad operas were staged in London between 1729 and 1733. Their characteristic feature was a rapid alternation of spoken dialogue with simple songs set to popular tunes of the day. Later musical productions of the same century, *e.g.* Arne's *Love in a Village*, differed from the true ballad opera in that the music was newly composed.

Ballance, JOHN (1839-93). New Zealand statesman. Son of an Ulster farmer, Ballance emigrated

to New Zealand, where he founded a newspaper at Wanganui. He served in the Maori War, and in 1875 was chosen a member of the legislature. In 1878 he joined

the ministry of Sir George Grey, and was treasurer until 1879. From 1884 to 1887 he was minister for lands and native affairs in Sir Robert Stout's ministry. He had strong influence in the party, which led New Zealand into experiments in state socialism. Leader of the Liberal party from 1889, he became premier in 1891. His programme of reform, much of which became law, included the imposition of a graduated income-tax and a land tax, the abolition of life membership of the second chamber, and women's suffrage. He died April 27, 1893.



J. Ballance, New Zealand statesman

Ballantine, WILLIAM (1812-87). British lawyer. Born in London, the son of a London police magistrate and educated at S. Paul's School, he was called to the bar at the Inner Temple in 1834, and became a serjeant-at-law in 1863. Acquiring a large practice in criminal cases, he appeared for Arthur Orton, the Tichborne claimant, in 1871, and successfully defended Malhar Rao, gaekwar of Baroda, on a charge of attempted murder, 1875. He died at Margate, Jan. 9, 1887. A familiar figure in the theatrical and literary life of his time, he is supposed to be the original of Chaffanbrass in Trollope's novel *Orley Farm*. He wrote *Some Experiences of a Barrister's Life*, 1882.

Ballantrae. Parish, seaside resort, and fishing village of Ayrshire, Scotland. On the Stinchar river, 12 m. S.W. of Girvan, it has



Ballarat. Sturt Street, main thoroughfare of a gold-mining centre originally laid out on garden city lines

Courtesy of the Australian Govt.

a pier and small harbour, herring and salmon fisheries, and was notorious for smuggling. It was apparently not the scene of Stevenson's *Master of Ballantrae*. Pop. 1,076.

Ballantyne, JAMES (1772-1833). Scottish printer and journalist. Born at Kelso and educated for the law, he founded *The Kelso Mail* in 1797, and with Sir Walter Scott's help started in 1802 the printing establishment in Edinburgh where Scott's works were printed. With his brother John (1774-1821) he had a half-share in a bookselling business in 1808, Scott holding the other half. He became part proprietor of *The Edinburgh Weekly Journal* in 1817, and was involved in the bankruptcy of Constable & Co. in 1826. He died Jan. 17, 1833.

Ballantyne, ROBERT MICHAEL (1825-94). British writer for boys. Born at Edinburgh, April 24, 1825, a nephew of James Ballantyne the printer, in 1841-47 he served as



R. M. Ballantyne, British author
Frédéric & Young

a clerk of the Hudson's Bay Company in Rupert's Land, describing his experiences in his first book, *Hudson's Bay* (1848). After holding a post in the publishing house of Constable of Edinburgh from 1848-1855, he devoted himself to literature. He published more than 80 volumes of stories, including *The Coral Island*, *The Gorilla Hunters*, and *Ungava*. He died at Rome, Feb. 8, 1894.

Ballarat or **BALLAARAT**. Third city of Victoria, Australia. It is 74 m. by rly. W.N.W. of Melbourne, and is an important rly. junction. Apart from gold-mining, its main industry, it has iron foundries, woollen mills, flour mills, breweries, and distilleries. It was laid out originally on garden city lines; is the seat of Anglican and Roman Catholic bishoprics, has municipal art galleries, a museum, botanic gardens, and a school of mines. Its elevation of 1,437 ft. gives it a cool and healthy climate.

Its rise is due to the discovery in 1851 of one of the richest alluvial goldfields in the world.

The mines are working auriferous quartz at deep levels, over 2,500 ft. At Bakery Hill, at 180 ft. depth, was found a nugget weighing 2,217 oz. Pop. 39,470.

Ballast (Swed. *bar*, bare, mere; *last*, load). Small stones and sand in varying proportions derived from alluvial or glacial deposits. In its English sense, the name is derived from material dredged in the lower reaches of the Thames and used to steady the trim of a slightly laden ship. During the Second Great War, ships arriving in Britain with war material from the Dominions and America and returning empty were ballasted with rubble from bombed sites. Most vessels, irrespective of their lading, require a certain amount of ballast for trim, and modern steamships are fitted with water tanks which are filled according to trimming requirements. (*See Navigation*.) In some types of pleasure craft iron ballast is carried in the form of ingots moulded

to the shape of the hull. Balloons carry sand ballast which is released to compensate for the contraction of the gas in the envelope.

Industrially, ballast is used as an aggregate for the making of concrete, and watered ballast forms the foundation of macadam roads. Crushed ballast mixed with tar is used as a surfacing material for roadways and footpaths. Crushed ballast is also employed for gritting tarred or bitumen-sprayed roads.

Ballater (Gael., town on hill-side). Police burgh and summer resort of Aberdeenshire, Scotland. It is on the Dee, here crossed by a fine bridge, and is 43 m. W.S.W. of Aberdeen by railway, being the terminus of the Deeside branch. It was founded in 1770 to furnish

accommodation for visitors to the Pannanich medicinal springs, situated about 3 m. N.E. About 9 m. to the W. is Balmoral Castle. Pop. 1,225.

Ball Bearings OR **ROLLER BEARINGS**. Bearings in which a series of steel balls or rollers is interposed between the revolving surfaces in order to lessen friction. *See Bearings.*

Balleny Islands. Group of five mountainous islands in Antarctica. They lie 220 m. N. of North Cape, S. Victoria Land, in lat. 66° 45' S., long. 163° E. Of volcanic origin, and glacier-covered, Freeman's Peak, on Young Island, is nearly 12,000 ft. high. The islands are named after John Balleny, the whale-fisher, who discovered them in 1839.

BALLET: CLASSIC AND MODERN

Cyril W. Beaumont, author of many books on Ballet

This article explains the meaning of this fascinating branch of theatrical art, and traces its evolution through five centuries, citing outstanding examples from Italy, France, Russia, England, and America. See also Dancing; Theatre, etc.

Ballet (Fr., from late Lat. *ballare*, to dance) is the term applied to a specific branch of the art of the theatre, when a particular theme or mood is expressed solely in terms of dancing and mime, inspired and controlled by music or a rhythmical base. Ballet is a composite art in which dancing, mime, music, costume, and setting all play their part.

The person responsible for the steps, movements, groups, and actions which make up a ballet is called the choreographer (Gk. *khoreia*, dance, and *graphia*, writing). Ballet embraces a whole vocabulary of movement, the human body being subjected to a rigorous discipline and elaborate training to enable it to be used as a superlative means of expression. The miming consists of a number of conventional gestures, probably bequeathed from ancient times, supplemented by borrowings from the *Commedia dell'Arte* and the stylised gestures of everyday life introduced by Michel Fokine. Although theoretically the best costume for the ballet dancer is none, in practice costume is essential in order to indicate to the spectator the qualities and station of the various characters. Scenery or lighting is used to establish a certain period, place, or mood.

A peculiar characteristic of ballet is that, because it is wordless, it differs from opera and the spoken drama, where sung or

verbal reference can be made to past or future events. In ballet every incident or action must be seen by the spectator, and if it is required to show the chronological past, this can be done only in the form of a flash-back.

Music is the mainspring of ballet. Some ballets are inspired by existing music, e.g. Massine's *Symphonie Fantastique* (Berlioz); some have music specially composed, e.g. Tchaikovsky's *La Belle au Bois Dormant* (The Sleeping Princess). Some scores are the product of direct collaboration between composer and choreographer, e.g. Stravinsky's *L'Oiseau de Feu*. Others consist of various selections arranged to form a homogeneous work, e.g. *Comus* (Purcell-Lambert).

Ballet, within certain limits, is an elastic medium of stage expression. It can present the most realistic of themes, as well as the most fantastic; it can conjure up a particular mood, or become a purely abstract composition in line and form. The highest form of ballet requires music, movement, and action to be so perfectly fused that they appear inseparable, while the dancing is expressive in itself and the mime danced.

Originally ballet was a costly entertainment devised by and for the aristocracy. It derives from the mummings, masquerades, and interludes of the 14th and 15th centuries. A famous interlude given in 1489 by Bergonzio di

Botta, of Tortona, took the form of a great feast at which each dish was presented with an appropriate dance.

The new fashion was warmly sponsored by Catherine de' Medici (1519-1589), who introduced it to the court of France, one of the most important spectacles being the Ballet Comique de la Reine (1581). In England ballet found expression in masques. Henry VIII (1509-1547) had his disguisings and revels, and these became more elaborate during the reign of Elizabeth.

In France under Louis XIV (1643-1715) ballet became dignified. The king himself danced in many ballets, and the art made great progress because of his refined taste and his practice of inviting the collaboration of the best talents in his realm; for instance, Lully composed the music, Molière wrote the themes, and Berain designed the costumes. In 1669 Louis XIV established the Académie Royale de Musique, to which in 1672 a school of dancing was added. This, later, became the state ballet, which spectacle presently passed from restricted performance at court to the public theatre.

First Women Dancers

Up to this period, ballets were really operas with opportunities for dancing. The personnel was composed of men alone, the women's rôles being taken by youths of feminine build, whose faces were concealed by masks, then a fixed part of the dancers' costumes. In 1681 a ballet, *Le Triomphe de l'Amour*, was given at St. Germain, in which the composer Lully introduced female dancers drawn from the court ladies. When this ballet was given publicly at Paris in 1683 the Académie supplied four *danseuses*, led by Mlle. Lafontaine, the first *première danseuse*.

Under Louis XV (1715-1774) the grandiose in ballet gave place to a refined artificiality. During this reign there were many innovations: Camargo's shortening of the skirt to facilitate foot technique; Heinel's introduction of the *pirouette à la seconde*, Sallé's dancing in a simple classical-style dress of muslin; Gardel's abolition of the mask; and the publication of Noverre's famous *Lettres sur la Danse et les Ballets* (1760), which demanded the substitution of dramatic action and expressiveness for mechanical technique. In 1832 a young Italian *danseuse*, Marie Taglioni, achieved a triumph in *La Sylphide*, the first of the

ballet's many contributions to the romantic movement. Previously ballets had depended mainly on classical mythology for their themes; after *La Sylphide*, wilis, peris, sylphs, and similar mysterious beings became the rage. The year 1841 saw the production of *Giselle*, which, with Carlotta Grisi in the title rôle and choreography by J. Perrot and J. Coralli, represents the supreme achievement of the romantic ballet.

Towards the middle of the century ballet in France and England began to decline. In England a revival took place in the 1870s as a result of the establishment of the Alhambra and Empire theatres, which, although devoted to vaudeville, made a strong feature of ballet, this position being maintained until 1914.

Great Russian Choreographers

The new stimulus to ballet as an art form was to come from Russia, where a state school of ballet had been founded in 1735. The great architect of the Imperial ballet was Marius Petipa (1822-1910), who controlled the ballet for the best part of fifty years, during which he composed 54 new ballets. His contribution was an incessant effort to develop and exploit technique, which he employed with brilliant effect in such ballets as *La Belle au Bois Dormant* (1890). Early in the 20th century a great new Russian choreographer, Michel Fokine (1880-1942), arose. He insisted that dance and mime should be employed only in expression of the theme; that gesture should partake of the whole body; and that expressiveness should reside in every part of the choreographic design. When Serge Diaghilev (1872-1929) wished to present Russian ballet to western Europe, he selected Fokine as his choreographer. This resulted in the presentation of *Les Sylphides*, *Le Carnaval*, and the production of the *Polovtsian Dances* from Prince Igor (1909), *Petrouchka* (1911), *Le Spectre de la Rose* (1911), and other famous ballets. Later, Diaghilev presented works by other Russian choreographers who achieved notable success, e.g. Massine's *Les Femmes de Bonne Humeur* and *La Boutique Fantastique* (1917), *Le Tricorne* (1919), Nijinska's *Les Biches* (1924), and Balanchine's *Le Fils Prodigue* (1929).

Diaghilev's success inspired the formation of other companies, such as the Ballets Suédois of Rolf de Maré, the Ballet Russe

of René Blum and Col. de Basil, also several English companies of varying size: Ballet Rambert. Sadler's Wells, Markova-Dolin, London, and International ballets. Some of the original compositions of these English companies, e.g. Howard's *Lady into Fox*, Ashton's *Apparitions* and *Dante Sonata*. De Valois's *Job* and *The Rake's Progress*, and Tudor's *Jardin aux Lilas* represent decided artistic achievements.

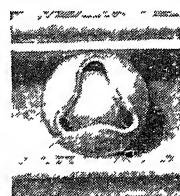
In the U.S.A., too, considerable ballet activity developed and resulted in the formation of American companies: Ballet Caravan, Philadelphia ballet, Page-Stone ballet, and the San Francisco ballet. In Soviet Russia the change of regime did not lessen the interest in ballet. The state schools were maintained, and many of the famous old productions associated with the Imperial ballet were given. In Russia ballets tend to be based on the national folk dance, which offers almost unlimited scope in its richness and variety.

Bibliography. Des ballets anciens et modernes, C. F. Menestrier, 1882; Ballets et Mascarades de Cour de Henri III à Louis XIV, P. Lacroix, 1886; Le Ballet de Cour de France avant Benserade et Lully, H. Prunières, 1914; Lettres sur la Danse et les Ballets, J. G. Noverre, 1760; The Code of Terpsichore, C. Blasis, 1830; Nash Ballet, A. A. Pleschcheyev, 1899; The Art of Ballet, M. E. Perugini, 1915; The Russian Ballet in Western Europe, W. A. Propert, 1921 and 1932; and, by C. W. Beaumont, A History of

Ballet in Russia (1613-1881, 1930; Michel Fokine and his Ballets, 1935; The Complete Book of Ballets, 1938, also Supplement, 1942; A Short History of Ballet, 1944; The Ballet called *Giselle*, 1944; The Diaghilev Ballet in London, 1945).

Ballet. Term used in music. (1) A madrigal, in the harmonic style, as distinguished from the true madrigal, in which free part-writing of a contrapuntal nature was the outstanding feature. Regular simultaneous rhythm, suitable for dancing, also appeared in the ballets. (2) Music for dancing associated with the stage, in a series of movements of varied character and pace, often with some kind of story as a background.

Ball-flower. An architectural ornament. It is a ball almost enclosed by flower petals, and is a characteristic feature of mouldings in the English Decorated period, where its repetition at short intervals gives points of light to a strip of dark hollow.



Ball-flower ornament in architecture

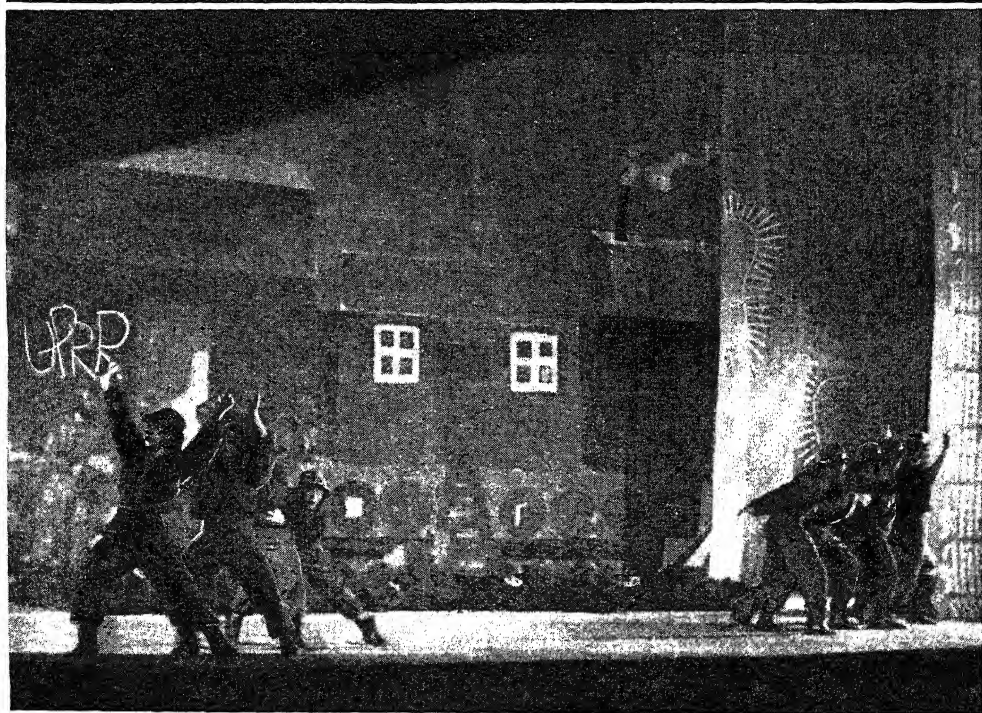
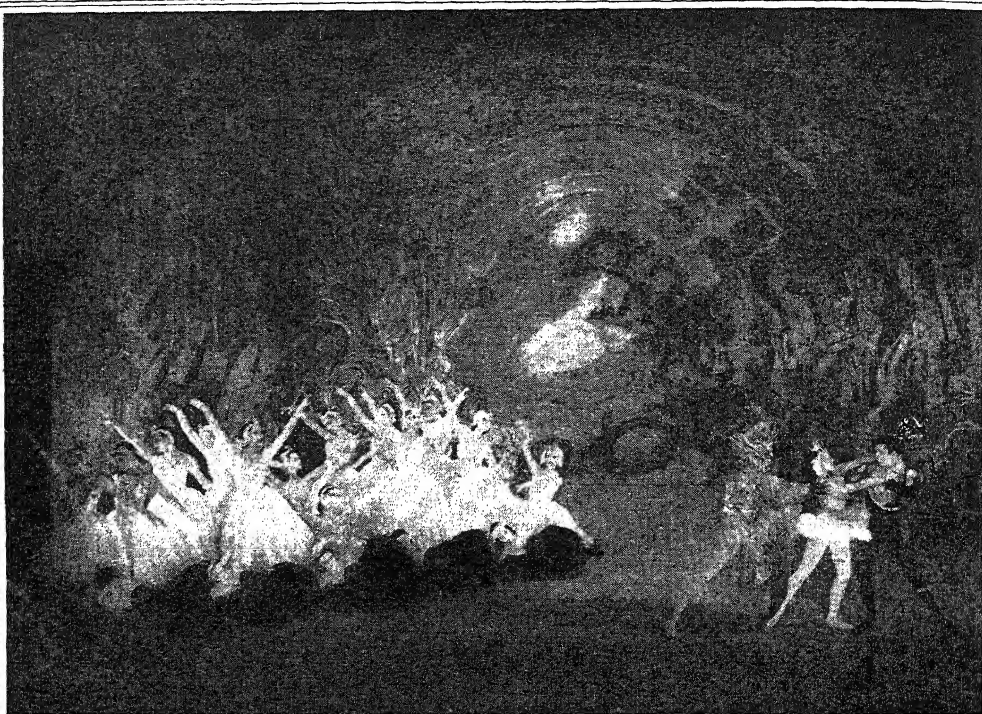
The windows of the tower of Hereford Cathedral and the upper parts of the towers and spires of Lichfield provide fine examples. See Decorated Period.

Ballia. Town and district of India, in the Benares division of the United Provinces. On the Ganges, 70 m. N.E. of Benares, the town is famous for its November

IMPORTANT BALLETS OF 150 YEARS

Title	Choreographer	Produced
<i>La Fille mal gardée</i>	Dauberval	Bordeaux, 1786
<i>Flora et Zéphire</i>	Didelot	London, 1796
<i>I Titani</i>	Viganò	Milan, 1819
<i>La Sylphide</i>	F. Taglioni	Paris, 1832
* <i>Giselle</i>	Perrot & Coralli	Paris, 1841
<i>La Esmeralda</i>	Perrot	London, 1844
<i>Le Corsaire</i>	Mazilier	Paris, 1856
<i>The Humpbacked Horse</i>	Saint-Léon	St. Petersburg, 1864
* <i>Coppélia</i>	Saint-Léon	Paris, 1870
* <i>La Belle au Bois Dormant</i>	Petipa	St. Petersburg, 1890
* <i>Le Lac des Cygnes</i>	Petipa & Ivanov	St. Petersburg, 1895
* <i>Les Sylphides</i>	Fokine	St. Petersburg, 1908
<i>Petrouchka</i>	Fokine	Paris, 1911
<i>L'Après-Midi d'un Faune</i>	Nijinsky	Paris, 1912
<i>Les Femmes de Bonne Humeur</i>	Massine	Rome, 1917
<i>Le Tricorne</i>	Massine	London, 1919
<i>Les Biches</i>	Nijinska	Monte Carlo, 1924
<i>Le Fils Prodigue</i>	Balanchine	Paris, 1929
<i>Job</i>	De Valois	London, 1931
<i>The Green Table</i>	Jooss	Cologne, 1932
<i>L'Épreuve d'Amour</i>	Fokine	Monte Carlo, 1936
<i>Lady into Fox</i>	Howard	London, 1939
<i>Dante Sonata</i>	Ashton	London, 1940
<i>Pillar of Fire</i>	Tudor	New York, 1942
<i>Hamlet</i>	Helpmann	London, 1942
<i>Miracle in the Gorbals</i>	Helpmann	London, 1944

* These earlier ballets marked with an asterisk were still in the repertory of many companies in 1950.

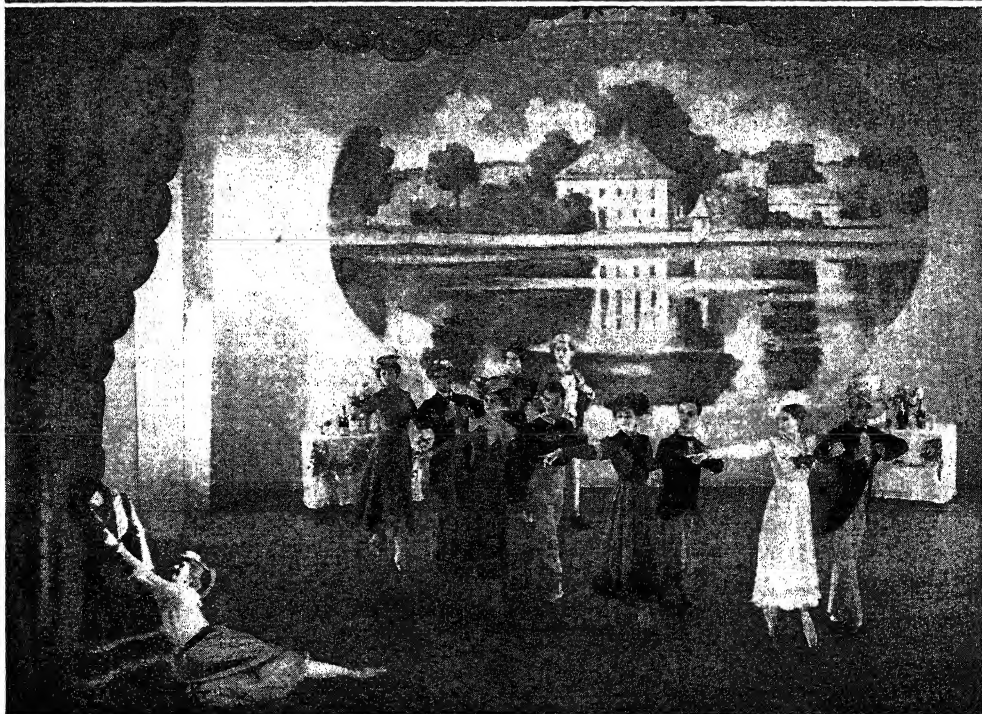
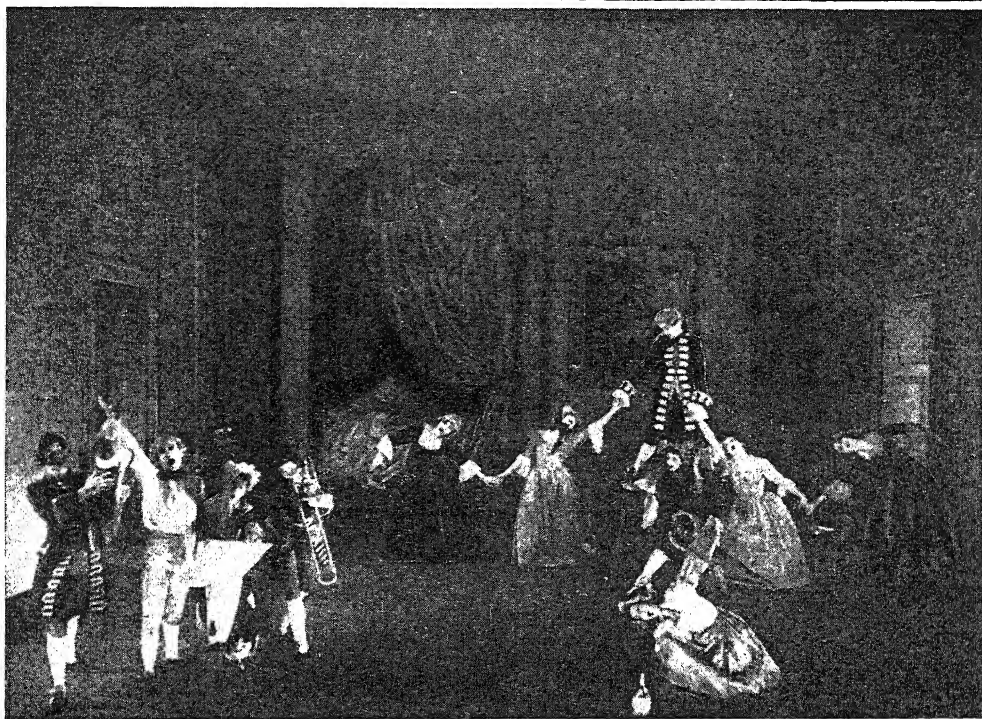


English ballet received its stimulus from the experiments of the Sadler's Wells and Rambert schools. Until the 1930s the Russian companies were supreme in W. Europe, but full-length works in the classic tradition forming the basis of the academic school, as opposed to that of Diaghilev, were successfully per-

formed by English companies. The upper picture shows Margot Fonteyn in a graceful pas de trois in Tchaikovsky's Swan Lake. The break in tradition carried on by the de Basil company after Diaghilev's death is illustrated in the lower picture. This ballet, Union Pacific, was first produced in 1932

BALLET: CLASSIC AND CONTEMPORARY STYLISM OF THE DANCERS' ART

Photos, Sedgwick and N.Y. Times



The Sadler's Wells company is seen in the upper picture in *The Rake's Progress*, a ballet in six scenes by Gavin Gordon, décor and costumes by Rex Whistler (after Hogarth). First produced 1935, this series of animated Hogarth pictures was a tragi-comic inter-

pretation of English society during the 18th century. The lower picture shows a scene from *Wedding Bouquet*, music by Lord Berners, choreography by Frederick Ashton, "asides" by Gertrude Stein. This also was first produced by the Sadler's Wells company in 1935

BALLET: 18th AND 20th CENTURY LIFE EXPRESSED IN DANCING

Photos, Sedgwick

bathing festival. The district of Ballia produces rice, barley, and sugar. Of the town pop. five-sixths, of the district nearly all, are Hindus.

Ballina. Urban district, seaport, and market town of co. Mayo, Eire. On the river Moy, 8 m. S. of Killala, it has a station on the Eire state rlys. It has important salmon-fisheries and trades in corn, beer, coarse linens, and snuff. It communicates by two bridges with Ardnaree, its suburb in co. Sligo. Taken by the French, Aug. 25, 1798, it was held by them for three weeks. Market day, Mon. Pop. 4,872.

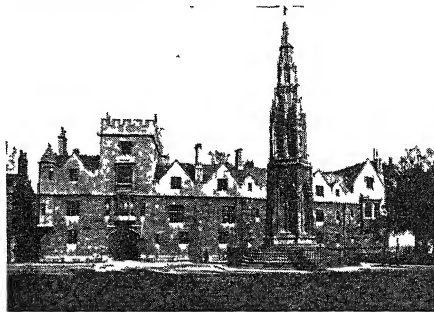
Ballinasloe. Urban district and market town of co. Galway, Eire. On the river Suck, 93 m. W.S.W. of Dublin by rly., it has carriage-building, flour-milling, and tanning industries. Its October fair (horses, sheep, and cattle) is one of the largest in the country, and it holds an annual race-meeting in July. Near by are Aughrim battlefield and Garbally Castle, the seat of the earls of Clancarty. Market day, Sat. Pop. 5,243.

Balliol College. One of the oldest and most famous colleges of the university of Oxford. It ranks



Balliol College arms

second in age on the official list. Founded by John Baliol of Barnard Castle in Durham (d. 1269) and his wife Devorgilla between 1263 and 1268, the society consists of a master, 28 fellows, and a number of scholars. John Wycliffe was once master. Especially during B. Jowett's mastership, 1870-93, Balliol had a great reputation, and furnished a large proportion of the professors and teachers of the university. Another powerful influence at Balliol was the philosopher T. H. Green. Among the statesmen educated here were Lord Oxford and Asquith, the marquess of Lansdowne, Lord Curzon, and Viscounts Grey and Milner. Writers who were at Balliol include Adam Smith, Southey, Clough, Calverley, Matthew Arnold, Swinburne, Belloc; among churchmen were Manning, Tait, and both Archbishops Temple. Its scholarships are coveted distinctions; most of them are open, but a few are restricted to Blundell's School, Tiverton, and some exhibitions to Glasgow. In 1887 New Inn Hall was incorporated with the college, which occupies a site at the corner



Balliol College, Oxford, fronting on St. Giles, with the Martyrs' Memorial to Ridley and Latimer

Valentine

of Broad Street and St. Giles. The buildings are mainly modern, and include a large hall, the chapel, and the library. Two fellowships, founded in 1906 by Lord Newlands, commemorate Dr. Jowett. Alone among Oxford colleges Balliol has the right to elect its own visitor. Its Sunday evening concerts have become famous.

Ballista or **BALISTA** (Gr. *ballein*, to throw). Military engine used in ancient and medieval warfare for hurling missiles.

Ballistic Pendulum. Instrument for the measurement of the momentum of a moving body. It provides one of the oldest methods of measuring the velocity of a small arms bullet. In this method the ballistic pendulum used is a box containing sand or some other material which is capable of stopping the bullet, suitably suspended from a fixed support so that it is able to swing back and forth in much the same way as the pendulum of a clock. The bullet is fired into the box, which therefore swings back. From a measurement of the length of this swing the velocity of the bullet can be deduced. As a means of velocity measurement, the ballistic pendulum has long been superseded, but it is still used in ballistic measurement. Attachments for reducing the recoil of guns have been tested by suspending the gun so as to form a ballistic pendulum.

Ballistics. Science dealing with the motion of warlike projectiles. It is divided as follows: (1) internal ballistics, which deals with the motion while the projectile is still in the bore of the gun and when it is moving under the influence of the gas pressure acting on its base; (2) external ballistics, which treats of the motion after the shell has left the gun and when it is moving under the influence of gravity and the resistance of the air; (3) terminal ballistics, which deals with

the motion of the missile during the penetration of armour plate.

Internal ballistics includes a study of the burning of the propellant charge, the gas pressure developed, and the velocity of the projectile as it travels along the bore of the gun. The internal ballisticians can forecast the ballistic performance of a given gun and propellant charge. He can also calculate the weight of propellant

and the size of sticks, tubes, or flakes making up the charge which will give the highest muzzle velocity without exceeding a specified maximum gas pressure.

The ancient theory of external ballistics emanated from Galileo and ignored the resistance of the air. Elementary works on dynamics show that the path of the projectile is, in these circumstances, a parabola. This elementary theory is of little practical value since modern artillery projects shell with high velocities, and the air's resistance has a large effect in retarding the motion of the shell. This retardation depends on the mass, diameter, and shape of projectile, on the density of the air, and on the velocity of the shell. The first three factors are allowed for by a quantity called the standard ballistic coefficient of the shell, which can be regarded as a measure of its carrying power. Today the shell is usually spun about its axis by means of a copper driving band and a rifled gun barrel. The purpose is to keep the nose of the projectile pointing along the trajectory and to preserve stability in flight. The trajectory can be calculated accurately.

The study of the motion of projectiles as they penetrate armour plate (terminal ballistics) has received much attention. It is possible to estimate with fair accuracy the thickness of armour likely to be penetrated by a shot of given mass and diameter striking with given velocity and direction. The discussion of the fragmentation of a shell when it bursts also lies within the province of this study. A discussion of the motion of rocket projectiles is rather different from that of a shell fired from a gun. The division between internal and external ballistics is usually made at the instant when all the propelling charge has been burnt. See Artillery; Gun, Naval.

Ballistic Test. Technical term for the evaluation of certain properties of explosives, propellants, guns, and projectiles. (1) The power of blasting explosives may be determined by the employment of the ballistic pendulum.

(2) Ballistic properties of propellants are determined by measuring the actual pressure caused by their explosion in a gun by means of the Crusher gauge, at the same time determining the propulsive effect by measuring the velocity with which the projectile leaves the weapon.

(3) The ballistics of a gun are evaluated by firing standard projectiles from it with a propellant whose properties have previously been determined, the range, accuracy, and velocity of the projectile being measured. (4) Projectiles undergo ballistic tests to determine their range, accuracy, and steadiness of flight when fired from standard guns with known propellants, and their capability of penetrating armour or other protective material when striking it at various velocities.

Ballistite. Smokeless powder introduced by Alfred Nobel (*q.v.*) in 1887. It consisted essentially of nitro-cellulose gelatinised with nitro-glycerine. The earlier products received an addition of benzene to aid solution; later camphor was added to the early powders to increase their stability. Ballistite caused considerable erosion of the gun. It was adopted for a time by Italy (military use) and Germany (naval use), and came into favour to some extent for sporting cartridges. The modern method of manufacture is based on the process of Lundholm and Sayers. See Explosives; Smokeless Powder.

Ballonet. Subsidiary air- or gas-filled chamber forming part of a balloon (*q.v.*). In some airships the ballonet held gas and was used to trim the vessel; in other types the loss of gas from the buoyancy chambers was counterbalanced by forcing air into one or more air-ballonets.

Ballon-sonde. Small balloon filled with hydrogen and equipped with self-registering meteorological instruments. It is released in order to collect data relative to the upper atmosphere. See Atmosphere; Radio-sonde.

Balloon (Fr. *ballon*, large ball). Bag of impermeable fabric inflated with gas lighter than air. Roger Bacon (1214-94) had visualised a big globe filled with "ethereal air, or fire atmosphere," and Francesco

de Lana proposed a lighter-than-air craft consisting of four hollow globes from which the air had been removed. But nothing practicable was put forward until 1767, when Joseph Black (1728-1799) suggested the possibility of inflating a bladder with hydrogen gas.

The earliest balloons of the brothers Montgolfier, de Rozier, Charles, and Robert (all made in 1783) are described under Aeronautics. Early in 1784, de Rozier and Romaine decided to put to practical test a theory they had evolved for combining hydrogen and hot air to inflate a balloon. The hydrogen was to supply the buoyancy, and the hot air below it was to maintain its volume, so enabling the balloon to retain its lifting power despite loss of gas through expansion. In theory the idea was sound, but in practice it was disastrous; a spark from the heating apparatus reached the hydrogen, and the balloon burst into flames, both men being killed.

The first balloon ascent in Great Britain was made at Edinburgh on Aug. 27, 1784, by James Tytler; Vincenzo Lunardi ascended over London on Sept. 15. The first sea crossing by balloon took place on Jan. 7, 1785, when Jeffries and Blanchard ascended from Dover and landed near Calais. Blanchard later opened a Balloon and Parachute Aerostatic Academy at Vauxhall.

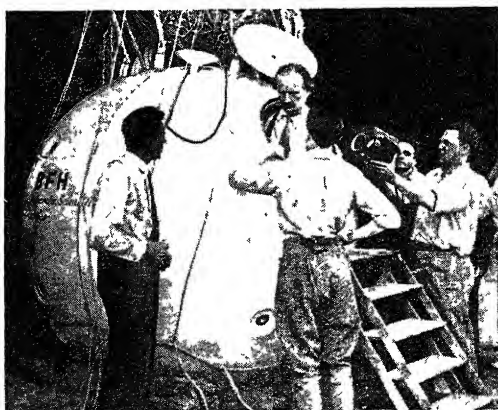
Inflation with hydrogen was so difficult and costly that ballooning did not achieve any great popularity until 1825, when Charles Green (1785-1870) hit upon the idea of inflating with ordinary coal gas. Green also invented the guide, or trail rope, which acted as an automatic equilibrator. On Nov. 7, 1836, Green, Monck Mason, and

Robert Holland, M.P., made their famous flight in the Great Balloon of Nassau. The balloon, which had a capacity of 70,000 cu. ft. and carried 1,000 lb. of ballast in addition to instruments, provisions, and parachutes (*q.v.*), ascended from Vauxhall, and landed near Weilburg, Nassau; the voyage of 500 m. took 18 hours.

The modern balloon, which, though differing in shape, is fundamentally the same as those designed by Green, has an envelope of either varnished cloth or gold-beater's skin. Over the envelope is a network of fine cord, from which is suspended the basket or gondola. At the top of the envelope is a valve operated by a cord hanging down inside the balloon which regulates the release of the gas. A rip panel is fitted so that in emergency the envelope can be torn open and instantly emptied of gas. Auxiliary equipment includes anchor, guide-rope, and ballast bags filled with sand.

Ballooning as an aid to scientific investigation of the upper air was pioneered by Gay-Lussac, who, in 1804, rose to 11,000 ft. and took notes of pressure and temperature. Later he ascended to 13,000 ft. In England a number of scientific ascents were made by Henry Tracey Coxwell and James Glaisher (first treasurer of the Aeronautical Society). They carried instruments for atmospheric observation and attempted to take photographs. On Sept. 6, 1862, they ascended from Wolverhampton and reached a height at which both men lost consciousness. When Glaisher recovered, the altimeter registered 29,000 ft., and as their descent was then 1,000 ft. per minute, he calculated that they must have reached 36,000 ft.

The taking of temperature and other records in the upper air remains one of the principal modern uses of the balloon. In Jan., 1934, a Soviet army balloon reached a height of 13½ m., but crashed and the three occupants were killed. In 1935 Auguste Piccard reached a height of over 10 m. The envelope



Balloon. Auguste Piccard in the gondola of the balloon with which he explored the stratosphere in 1935

of his craft was made of cotton and was 96 ft. in diameter, supporting an aluminium pressure-cabin which with instruments, occupants, and ballast weighed 2,640 lb. During the ascent many valuable data were collected regarding cosmic radiation (*q.v.*). On Nov. 11, 1935, Capt. O. A. Anderson and Captain A. W. Stevens of the U.S. Army Air Corps reached an altitude of 14 m. in the stratosphere balloon Explorer II.

Data are also collected from the upper air by means of unmanned balloons. They carry self-recording instruments and when the balloon bursts through pressure of the gas in the rarefied atmosphere at the great heights reached, the instruments float to the ground on parachutes. In 1936 an automatic sounding balloon or ballon-sonde (*q.v.*) ascended from Moscow and reached a height of 25 m. It carried a radio transmitter which automatically recorded its progress.

Balloons were early adopted for military use. At the battle of Fleurus, June 26, 1794, the French artillery was directed by an officer observing from a captive hot-air balloon. Balloon observation was employed by Napoleon in Egypt in 1798. Balloons were extensively used during the American Civil War, and at the siege of Paris in 1870 they were used both for observation and for carrying letters and dispatches from the beleaguered capital. During the S. African War, mobile balloon units were formed by the Royal Engineers.

Kite Balloons

During the First Great War the Germans introduced the kite balloon for artillery observation. This balloon, which was quickly adopted by all the belligerents, was sausage-shaped, with air-filled fins or stabilisers. It was secured to the ground like a kite and placed obliquely against the wind. The interior of the envelope was divided by a horizontal, gas-tight partition; the larger upper half contained the gas, and the lower air, or air and gas mixed. The envelopes were made of two layers of cloth, covered with rubber dissolved in benzene or treated with dope and having between them a sheet of vulcanised rubber. A kite balloon possessed remarkable stability, could remain aloft in a high gale, and the envelopes were practically unharmed by small-arms fire, though they were quickly fired by incendiary bullets. Kite balloons were also used to support nets of thin steel cables as an A.A. defence.

Apart from the barrage balloon (*q.v.*), neither free nor captive balloons were extensively used during the Second Great War. The kite balloon was too vulnerable for observation purposes, and its function could better be performed by aircraft. The Japanese used free balloons to carry explosives and incendiaries across the Pacific to the U.S.A. These balloons were made of oiled paper and inflated with hydrogen; they were 30 ft. in diameter and carried a

load of 80 lb. of explosives. They took about five days to cross the Pacific, and were fitted with a time fuse set to release the explosive. These weapons, however, were completely ineffectual as they could not be directed against any specific target. Experiments with somewhat similar incendiary weapons were made by Great Britain against crops in occupied Europe. See Aeronautics; Airship; Meteorology; Zeppelin, etc.; *consult also* the Andrée Diaries. 1931.

BALLOON DEFENCES IN MODERN WAR

Air Marshal Sir Leslie Gossage, K.C.B., C.V.O., D.S.O.
and Squadron-Leader Jack Davies, R.A.F.

The Air Officer Commanding, R.A.F. Balloon Command, 1941-44, has cooperated in this detailed explanation of the nature and purpose of balloon barrages and similar forms of defence. Parallel articles are those on Anti-Aircraft Command; Coastal Command; etc.

The idea of using balloons as a means of defence against air attack was considered before and during the First Great War. During 1917-18, France, Italy, and Germany all flew forms of balloon barrages, while in England series of so-called balloon aprons were flown as a counter to the Giant Gotha aircraft which constituted the chief air menace to London at that time. There were 10 aprons deployed at intervals between Lewisham and Tottenham. Each comprised three balloons joined together at the top of their flying cables by a cross cable from which hung, at intervals of 25 yds., a number of weighted wire streamers. The whole flew at a height of between 7,000 and 10,000 ft. The only case of an aircraft flying into an apron occurred in Jan., 1918, when a Gotha flew into one near Chingford; the aircraft was undamaged, but the apron suffered considerably. In their effect on enemy morale, however, the aprons were more successful. In March, 1918, a report was made to Gen. von Höppner, commander of the German Military Air Service, that they "... added greatly to the difficulties of attack. If they increased and improved much more they would make a raid on London almost impossible." But the aprons had major disadvantages. They could not be flown in medium or strong winds, and they were expensive to maintain, particularly in manpower. In consequence, shortly after the end of the war the aprons, and the organization responsible for them, were regarded as obsolete.

THE INTER-WAR PERIOD. The question of employing balloons in A.A. defence was not abandoned.

At first the intention was to provide a high altitude barrage; but with the concurrent improvement in the all-round performance of aircraft (particularly with regard to ceiling) and in bombing technique, it was decided that balloons could best be used in barrage form as a defence against low flying attack. In effect, they were not to bring aircraft down but to keep them flying high.

BALLOON BARRAGES. A balloon barrage consists of a number of balloons each flying a cable from its own winch, and deployed over and around the area which it is to protect. A large barrage to protect a target of the size of London may have as many as 450 balloons; a barrage to protect a small target, such as an aircraft factory, may require only 24 balloons.

The kite balloon designed for barrage work was known as the L.Z. (Low Zone) kite balloon. Hydrogen-inflated, it flew to 6,000 ft. carrying a cable with a breaking strain of not less than 3½ tons. Its volume was 19,150 cu. ft., length 62·8 ft., weight 565 lb., and it was designed to operate in wind speeds up to 60 m.p.h. See Barrage Balloon.

The purpose of a balloon barrage is to deny air space to the enemy and to force his aircraft to fly to a height at which they can be effectively engaged by guns and fighter aircraft. In order to prevent aircraft flying through barrages, therefore, balloon cables must be lethal to aircraft. This was achieved by fitting a cutting device to each end of the standing (or flying) part of the cable; above the cutting device at the top, and below it at the bottom, was fixed a bag containing a parachute; the parachutes, in

turn, were attached to the cable in between the cutting devices and as near to them as possible. When an aircraft struck the cable, the force of impact sent a tension wave up and down it, causing the cutting devices to sever it at each end before the aircraft had time to do so at the point of impact. The aircraft thus carried away the major (central) portion of the cable, pulling the parachutes attached to both ends out of their bags. The parachutes opened and the resulting drag on the aircraft caused it to stall and crash.

FORMATION OF BALLOON COMMAND. In the autumn of 1938 balloon barrages were established at London, Birmingham, Derby, Liverpool, Widnes, Runcorn, Manchester, Bristol, Portsmouth, Southampton, Plymouth, Cardiff, Tyne and Tees, Sheffield, Hull, and Glasgow. To administer these barrages, Balloon Command, R.A.F., was formed on Nov. 1 with Air Vice-Marshal O. T. Boyd as Air Officer Commanding. The new command came directly under the Air Ministry for all matters except that operationally it was under the orders of Fighter Command. Five group headquarters were formed to control the 18 balloon centres which serviced and supplied the 48 squadrons which were to fly the balloons. The barrages were manned by a nucleus of R.A.F. personnel; but the bulk of the original force was provided by the Auxiliary Air Force. In 1941, when the manpower situation had become critical, airwomen of the W.A.A.F. were trained as balloon operators and substituted for airmen in many barrages.

In Sept., 1939, some 642 balloons were flying; two years later there were over 2,400. At first the enemy tried to combat balloons by shooting them down (on Aug. 31, 1940, the entire Dover barrage of 23 balloons was shot down in 6 minutes); and next fitted their aircraft with a balloon fender along

the entire length of the mainplane rather than on the lines of a bumper on a car. The intention was that the fender should either break the cable or, alternatively, push it to one side. As the fender weighed about 800 lb., it considerably reduced the performance of the aircraft and was eventually abandoned in favour of a cable cutter.

FLYING POLICY. The original policy was that the balloons should go up at the outset of war and remain up night and day, except possibly in gales or thundery conditions. It was soon apparent, however, that controls would have to be imposed upon them for the benefit of friendly aircraft, and the balloons were frequently grounded at the request of flying commands. Nevertheless, friendly aircraft were destroyed as the result of collisions with balloon cables, and it was evident that a new flying policy had to be found. Late in 1941, Air-Marshal Sir L. Gossage, who had succeeded Air Vice-Marshal Boyd, suggested a reversal of the original policy. Balloons were to be grounded at all times except when an attack was threatened or when they were required to fly for training purposes. Certain coastal barrages were excluded from this rule because it was not possible to give them adequate warning of attack. From this time the toll of friendly aircraft diminished.

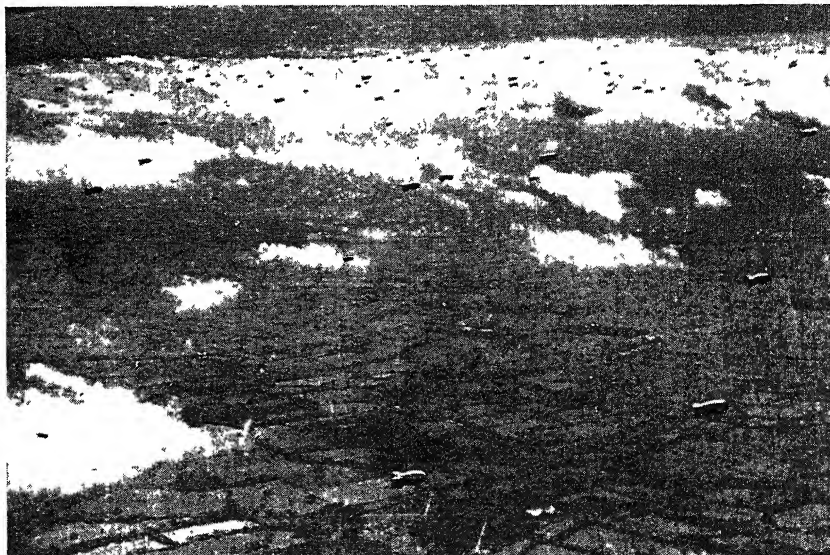
During the first two years of the war balloons were regarded as a static form of defence, but in 1942,

when the Germans initiated the series of Baedeker raids (*q.v.*) against cathedral cities, mobile squadrons were formed and rushed to protect the cities. The success of this manoeuvre was acknowledged.

Balloons were best able to prove their practical value during the summer of 1944, when the enemy launched flying bombs against London. A curtain barrage, which eventually comprised 2,015 balloons, was deployed in the home counties to defend the capital. Hundreds of flying bombs were destroyed by guns and fighter aircraft before they reached the balloon curtain; of those that did reach it, 278 were brought down.

OVERSEAS SQUADRONS. The use of balloons was not restricted to the British Isles: 11 squadrons were formed in England for service in the Middle East; 5 more squadrons were dispatched to India and Ceylon. All these units, trained and equipped by Balloon Command, provided valuable protection for targets varying from installations on the Suez Canal to R.A.F. maintenance units.

During the invasion of Sicily and Italy balloons were successfully used during offensive operations. Specially trained airmen landed their balloons with the first assault troops in order to give protection against dive-bombing attack. The effect on the morale of the attacking troops is said to have been considerable. Balloon units repeated this rôle during the invasion of



Balloon Defences. Section of the balloon barrage set up in southern England against the flying bomb attacks of June–Sept., 1944. See also illus. in p. 896

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Normandy. Ships, landing craft, and the assault beaches were all provided with balloon cover. Further balloon barrages were flown in Italy, Holland, and finally to protect bridges across the Rhine over which Allied troops moved into Germany.

Balloons were useful not only in protecting land targets but also at sea. A mobile balloon barrage flotilla escorted the Channel convoy from Sheerness to Southampton and back on 166 occasions, despite every effort of the enemy to destroy both ships and balloons. As a result of this success and because of the increasing air attacks on shipping in home waters, the Admiralty decided to protect coastwise shipping by equipping each ship with a balloon. Series of shore servicing stations were established around the coast and by July, 1941, they were responsible for 1,200 transfers of balloons from ship to shore and shore to ship every week. Two years later this figure had been trebled, and the scheme was extended to ships sailing in the Mediterranean, and the Indian and Arctic Oceans.

THE MARK VI BALLOON. The balloon used by ships and by squadrons operating overseas differed from the Low Zone balloon. Known as the Mark VI (and later the Mark XIII) balloon, it had a capacity of 2,500 cu. ft. and was flown from light 15-gauge piano wire at an altitude of 2,000 ft. It was armed in a similar manner to the L.Z. balloon except that instead of having parachutes at each end of the cable it had a parachute at one end and an aerial mine at the other. The principle was the same. When the aircraft carried away the central portion of the cable, the parachute was pulled out of its bag at one end, and the aerial mine was freed at the other. The drag of the parachute pulled the mine on to the wing where it exploded on impact.

During the winter of 1940-41, Balloon Command was responsible for operating a free balloon barrage. This, in effect, was an aerial minefield. Hundreds of small balloons, each carrying a trailing length of piano wire attached to the end of which was an aerial mine, were released on two or three occasions in the path of attacking aircraft; but they were not considered successful. Similar small balloons carrying leaflets over occupied territory had greater success. The leaflets were released



Balloon Defences. Examples of balloons moored to barges and used for the protection of merchant ships in convoy

by the operation of a slow-burning time fuse. In the Western desert, a Mark VI balloon flight was used to protect the train which ran daily between Alexandria and Capuzzo. This form of defence could be used only where there were no bridges over the permanent way. Balloons were also used to train parachutists, and at one training school alone over 100,000 jumps were made from balloons, each pupil doing at least two before progressing to aircraft descents.

Early in 1945 the Allies held complete control of the air over the British Isles. Balloons were no longer required for home defence purposes and Balloon Command was given the order to stand down.

Balloon Mine. Canister filled with high explosives and suspended by a thin steel cable from a small, free, hydrogen-filled balloon. During the Second Great War balloon mines were released in the path of enemy bombers and were fused to explode when any part of the aircraft touched the canister, wire, or balloon. Balloon mines were not extensively used, as they could not be controlled and were liable to become dangerous to friendly aircraft. A later and more successful development of the balloon mine was to attach the canister to the cables of captive barrage balloons.

Ballot (Fr. *ballotte*, little ball). System of secret voting. It has been adopted in both ancient and modern times in all important states at the election of representatives to serve on public bodies, the object being to prevent intimidation and bribery. At first small balls were used in balloting, hence the name, and this method still obtains in electing members to private clubs, one black ball or a certain proportion of black balls excluding the candidate.

In elections of other kinds the usual plan is for the names of the candidates to be printed on a voting paper in alphabetical order, and for the voter to make a cross opposite the name of the person or persons whom he supports. This marking takes place in a private compartment at the local polling station, and the marked paper is folded up and placed by the voter in a ballot box, to which no one has access until the votes are counted. Only when there is a scrutiny of the votes can the voting of any citizen be traced by the official pencilling of his registration number on his ballot paper.

Vote by ballot was first employed in England in the case of the London School Board Election of 1870. The Ballot Act for fixing the procedure in parliamentary and municipal elections was passed in 1872, after the method had been debated in the House for thirty years. See Election; Vote.

Ballymena (Gael., middle-town). A borough and market town of co. Antrim, N. Ireland. On the river Braid, it is 33 m. N.W. of Belfast by rly. It has important brown linen and flax industries. Close by is Ballymena Castle. Market day, Sat. Pop. 13,510.

Ballynahinch (Gael., town on the island). Market town of co. Down, N. Ireland. On the river Annacloy, it is 21 m. S. of Belfast, and has a railway station. Near are chalybeate springs. Market day, Thurs. Pop. 1,667.

Ballyshannon. Seaport and market town of county Donegal, Eire. On the Erne estuary, in Donegal Bay, it is 15 m. S.S.W. of Donegal by rly. Pop. 2,170. A new hydro-electric scheme, linked with the Shannon development scheme, has greatly transformed the character of the town, involving the narrowing of the Erne, the disappearance of the famous falls of Assaroe, the flooding of 900 acres above Ballyshannon, and the virtual end of the Erne as a great salmon-fishing river. See Erne; Shannon.

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